FM 6-20-20

Tactics, Techniques, and Procedures for

FIRE SUPPORT AT BATTALION TASK FORCE AND BELOW

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HEADQUARTERS, DEPARTMENT OF THE ARMY

Field Manual 6-20-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
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Tactics, Techniques, and Procedures for

FIRE SUPPORT AT BATTALION TASK FORCE AND BELOW

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PREFACE

The purpose of this field manual is to provide the most current essential information about fire support at brigade (bde), battalion (bn) task force (TF), and company team levels. This field manual is intended as a quick reference. It assumes that the user has a basic understanding of maneuver and fire support doctrine and principles. The manual also assumes the user has a complete understanding of the technical operation of fire support equipment and systems.

Technical observed fire procedures are in FM 6-30. Fire support tactics, techniques, and procedures (TTPs) in brigade, division, and corps operations are in FM 6-20-30, FM 6-20-40, and FM 6-20-50. The TTPs for the targeting process are in FM 6-20-10. These manuals demonstrate how the fire support system does the essential tasks set forth in FM 6-20.

The proponent of this publication is HQ TRADOC. Submit comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to:

Commandant
US Army Field Artillery School
ATTN: ATSF-DD
Fort Sill, Oklahoma 73503-5600

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

CHAPTER 1

INTRODUCTION TO FIRE SUPPORT

SECTION I

FIELD ARTILLERY MISSIONS

1-1. ROLES OF FIELD ARTILLERY

a. Close Support. Close support fires are fires used to engage enemy troops, weapons, or positions that are threatening the supported force. Close support expands battlefield depth, erodes enemy forces, and inflicts damage well beyond direct fire ranges.

b. Attack at Depth (Interdiction). Artillery fires that attack at depth are used to delay and destroy enemy forces that, because of range limitations or intervening terrain, cannot fire their primary weapon systems on friendly forces. Targets include first-echelon forces not participating in the direct battle and follow-on echelons. Attacking at depth creates "windows" for friendly unit offensive maneuver.

c. Counterfires. Counterfires consist of fires targeted throughout the battlefield that are intended to attack the total enemy fire support system. Counterfire includes fires

against accompanying mortars; helicopter forward operating bases; vector target designation points; artillery, rocket, air defense, and missile systems; and support and sustainment installations.

1-2. EFFECTS OF FIRES

A commander decides what effects fire support must have on a particular target. There are three types of fire: destruction, neutralization, and suppression.

a. Destruction. Destruction puts a target out of action permanently. Direct hits with high-explosive (HE) shells or improved conventional munitions (ICM) are required to destroy hard materiel targets. Thirty percent casualties or materiel damage usually renders a unit ineffective. Destruction often requires large expenditures of ammunition and is not considered economical, except for ICM or "smart" weapons.

b. Neutralization. Neutralization knocks a target out of action temporarily. Normally, a target is neutralized when it suffers 10 percent or more casualties or damage. It can be achieved by use of any type of shell-fuze combination suitable for attacking a particular type of target. Neutralization does not require extensive expenditure of ammunition and is the most practical type of mission. Most missions are neutralization fire.

c. Suppression. Suppression of a target limits the ability of enemy personnel in the target area to perform their jobs. Firing smoke or HE with a variable time fuze (HE-VT) creates apprehension and confuses the enemy. The effect of suppressive fires usually lasts only as long as the fires are continued. Suppression requires a low expenditure of ammunition; however, since its effects are not lasting, it is unsuitable for many targets.

1-3. STANDARD TACTICAL MISSIONS

a. Inherent Responsibilities. The fire support officer (FSO) informs the maneuver commander of the tactical missions assigned to the field artillery (FA) units supporting the operation. These tactical missions (Table 1-1) describe in detail the fire support responsibilities of field artillery units. This information is vital to planning fire support for tactical operations.

b. Tasks and Responsibilities. Table 1-2 shows the tasks and responsibilities for control of artillery in an ABCA (American, British, Canadian, and Australian) operation.

Table 1-1. **THE SEVEN INHERENT RESPONSIBILITIES OF FIELD ARTILLERY STANDARD TACTICAL MISSIONS**

AN FA UNIT WITH A MISSION OF—	DIRECT SUPPORT	REINFORCING	GENERAL SUPPORT REINFORCING	GENERAL SUPPORT
Answers calls for fire in priority from—	1. Supported unit. 2. Own observers.[1] 3. Force FA HQ.	1. Reinforced FA. 2. Own observers.[1] 3. Force FA HQ.	1. Force FA HQ. 2. Reinforced unit. 3. Own observers.[1]	1. Force FA HQ. 2. Own observers.[1]
Has as its zone of fire—	Zone of action of supported unit.	Zone of fire of reinforced FA unit.	Zone of action of supported unit to include zone of fire of reinforced FA unit.	Zone of action of supported unit.
Furnishes FIST or FSE[2]—	Provides temporary replacements for casualty losses as required.	No requirement.	No requirement.	No requirement.
Furnishes liaison officer—	No requirement.	To reinforced FA unit HQ.	To reinforced FA unit HQ.	No requirement.
Establishes communications with—	FSOs and supported maneuver unit HQ.	Reinforced FA unit HQ.	Reinforced FA unit HQ.	No requirement.
Is positioned by—	DS FA unit commander or as ordered by force HQ.	Reinforced FA unit or as ordered by force FA HQ.	Force FA HQ or reinforced FA unit if approved by force FA HQ.	Force FA HQ.
Has its fires planned by—	Develops own fire plans.	Reinforced FA unit HQ.	Force FA HQ.	Force FA HQ.

[1]Includes all target acquisition means not deployed with supported unit (radar, aerial observers, survey parties, and so forth).
[2]An FSE for each maneuver brigade, battalion, or cavalry squadron and one FIST with each maneuver company or ground cavalry troop are trained and deployed by the FA unit authorized these assets by TOE. After deployment, FISTs and FSEs remain with the supported maneuver unit throughout the conflict.

LEGEND: DS = direct support; FIST = fire support team; FSE = fire support element; HQ = headquarters; TOE = tables of organization and equipment

Table 1-2. **TACTICAL TASKS AND RESPONSIBILITIES FOR CONTROL OF ARTILLERY (NATO AND ABCA)**

ARTILLERY WITH TACTICAL TASK OF	ANSWERS CALLS FOR FIRE IN PRIORITY FROM	ESTABLISHES LIAISON WITH	ESTABLISHES COMMUNICATION WITH	FURNISHES FORWARD OBSERVERS TO[1]	WEAPONS MOVED AND DEPLOYED BY (POSITIONED BY)	HAS AS ITS ZONE OF FIRE	HAS ITS FIRES PLANNED BY	NATIONS TO WHICH TERMINOLOGY APPLIES
Direct Support	Directly supported formation or unit. Own observers. Force field artillery.[2]	Directly supported maneuver formation or unit.	Directly supported formation or unit (battalion, regiment, or brigade).	Each maneuver company of the directly supported formation or unit.	Direct support artillery unit commander or as ordered by force field artillery HQ.[2]	Zone of action of the directly supported formation or unit.	Develops own fire plans in coordination with directly supported formation or unit.	BE, DA, FR, GE, IT, NL, TU, US
	Directly supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	Directly supported formation or unit.	Directly supported formation or unit.	Directly supported formation or unit.	Next higher artillery HQ.	Zone of action of the directly supported formation or unit or as ordered by higher artillery HQ.	Artillery formation or unit in direct support in conjunction with directly supported formation or unit.	AS, CA, NO, UK
In Support	Supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Next higher artillery HQ.	Zone of action of the supported formation or unit or as ordered by higher artillery HQ.	Next higher artillery HQ.	AS, CA, UK
At Priority Call	Formation or unit to which placed at priority call. Any other supported formation or unit. Any other formation or unit as authorized by the controlling HQ.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Next higher artillery HQ.	Zone of action of the formation or unit to which placed at priority call or as ordered by higher artillery HQ.	Formation or unit to which placed at priority call.	AS, CA, UK

Table 1-2. **TACTICAL TASKS AND RESPONSIBILITIES FOR CONTROL OF ARTILLERY (NATO AND ABCA) (Continued)**

ARTILLERY WITH TACTICAL TASK OF	ANSWERS CALLS FOR FIRE IN PRIORITY FROM	ESTABLISHES LIAISON WITH	ESTABLISHES COMMUNICATION WITH	FURNISHES FORWARD OBSERVERS TO[1]	WEAPONS MOVED AND DEPLOYED BY (POSITIONED BY)	HAS AS ITS ZONE OF FIRE	HAS ITS FIRES PLANNED BY	NATIONS TO WHICH TERMINOLOGY APPLIES
General Support	Force field artillery HQ[2] and target aquisition artillery. Own observers.	No inherent requirement.	No inherent requirement.	No inherent requirement.	Force field artillery HQ.[2]	Zone of action of the supported formation or unit or zone prescribed.	Force field artillery HQ.[2]	BE, DA, FR, GE, IT, NL, NO, TU, US
General Support Reinforcing	Force field artillery HQ.[2] Reinforced artillery unit. Own observers.	Reinforced artillery unit.	Reinforced artillery unit.	Reinforced artillery unit if approved by force field artillery HQ.[1,2] Applies also to the provision of liaison officers.	Force field artillery HQ[2] or reinforced artillery unit if approved by force field artillery HQ.[2]	Zone of action of the supported formation or unit to include zone of fire of the reinforced artillery unit.	Force field artillery HQ[2] or as otherwise specified.	AS, BE, DA, FR, IT, NL, TU, US
Reinforcing	Reinforced artillery unit. Own observers. Force field artillery HQ.[2]	Reinforced artillery unit.	Reinforced artillery HQ.	Reinforced field artillery unit. Applies also to the provision of liaison officers.	Reinforced field artillery unit or as ordered by force field artillery HQ.	Zone of fire of the reinforced artillery unit or zone prescribed.	Reinforced artillery unit.	BE, DA, FR, IT, GE, NL, NO, TU, US

[1]The US will not furnish forward observers but will furnish fire support teams (on request).

[2]Force artillery headquarters or higher artillery headquarters.

LEGEND:

AS	= Australia	FR	= France	NO	= Norway
BE	= Belgium	GE	= Germany	TU	= Turkey
CA	= Canada	IT	= Italy	UK	= United Kingdom
DA	= Denmark	NL	= Netherlands	US	= United States

SECTION II

FIRE SUPPORT PLANNING AND COORDINATION

1-4. DEFINITIONS

a. Fire Support. Fire support is the collective and coordinated use of indirect fire weapons, armed aircraft, and other lethal and nonlethal means in support of a battle plan. Fire support includes mortars, field artillery, naval gunfire, air defense artillery in secondary mission, and air-delivered weapons. Nonlethal means are electronic warfare (EW) capabilities of military intelligence organizations, illumination, and smoke. The force commander employs these means to support his scheme of maneuver; to mass firepower; and to delay, disrupt, or destroy enemy forces in depth. Fire support planning and coordination exist at all echelons of maneuver. Fire support destroys, neutralizes, and suppresses enemy weapons, enemy formations or facilities, and fires from the enemy rear area. In deep operations, fire support could be the principal means of destroying enemy forces. In this event, the scheme of maneuver would be designed specifically to capitalize on the effects of fire support.

b. Fire Support Planning. Fire support planning is the continual process of analyzing, allocating, and scheduling fire support. The goal of fire support planning is to effectively integrate fire support into battle plans to optimize combat power. It is performed concurrently with battle planning.

c. Fire Support Coordination. Fire support coordination is the continual process of implementing fire support planning and managing the fire support assets that are available to a maneuver force.

d. Fire Planning. Fire planning is the continual process of selecting targets on which fires are prearranged to support a phase of the commander's plan.

e. Fire Support Assets. Fire support assets include:

- Field artillery (cannon, missiles, rockets).
- Mortars.
- Naval gunfire (NGF).
- Tactical air (TACAIR).
- Attack helicopters.
- Electronic warfare.

The effective coordination of fire support assets helps the maneuver

commander achieve maximum combat power through synchronization.

1-5. PRINCIPLES

a. The purpose of fire support planning and coordination is to optimize the use of the fire support system by integrating and synchronizing it with the battle plan.

b. Synchronized violent execution is the essence of decisive combat. Synchronized combined arms complement and reinforce each other, greatly magnifying their individual effects. In AirLand Battle doctrine, synchronization applies both to conventional forces and, when authorized, to nuclear and chemical weapons. It also characterizes our operations with other services and allies.

c. Forceful and rapid operations achieve at least local surprise and shock effect. Commanders and FSOs must look beyond these immediate effects when they plan operations and/or fire support. They must make specific provisions in advance to exploit the opportunities that tactical success will create.

d. The FSO (at any level) uses the following principles and guidelines to synchronize fire support with the commander's concept of the operation:

- Consider what the commander intends to do.
- Plan early and continuously.
- Exploit all available targeting assets (combat electronic warfare and intelligence [CEWI], radars, scouts, and so forth).
- Use all available lethal and nonlethal fire support means (FA, mortars, NGF, and TACAIR). Do not forget reinforcing and general support reinforcing artillery.
- Use the lowest echelon able to furnish effective support.
- Use the most effective means (mortars for quick smoke and 203-mm or 155-mm for a destruction mission).
- Provide adequate fire support.
- Avoid unnecessary duplication (do not have mortars and FA and/or NGF firing at the same target unless required).
- Provide for safety of friendly forces and installations.
- Provide for flexibility.
- Furnish the type of fire support requested.
- Consider the airspace.
- Provide rapid and effective coordination.
- Keep all fire support personnel informed.

1-6. FIRE SUPPORT TASKS

a. Basic fire support tasks are as follows:

- Support the forces in contact.
- Support the battle plan.
- Synchronize the fire support system.
- Sustain the fire support system.

b. The following fire support tasks are performed in support of all combat operations:

- Locate targets.
- Integrate all available fire support.
- Destroy, suppress, or neutralize enemy direct and indirect fire weapons.
- Provide illumination and smoke.
- Provide fires in support of joint air attack team (JAAT) and suppression of enemy air defense (SEAD) operations.
- Deliver scatterable mines.
- Prepare for future operations.
- Provide positive clearance of fire.

c. Offensive fire support tasks include the following:

- Execute all plans as the commander intends.
- Support the movement to contact or meeting engagement.
- Soften enemy defenses before the attack by arranging short, violent preparations when required.
- Provide support during the attack by attacking high-payoff targets.
- Plan for deep and flanking fires.
- Plan fires during consolidation.
- Plan fires for exploitation and pursuit.
- Provide counterfires.

d. Defensive fire support tasks include the following:

- Execute all plans as the commander intends.
- Disorganize, delay, and weaken the enemy before the attack.
- Provide counterfires.
- Provide fires in support of planned engagement areas.
- Attack high-payoff targets.
- Plan fires in support of barrier and obstacle plans.
- Plan for deep, flanking, and rear area fires.
- Provide fires to support counterattacks.
- Plan final protective fires.

1-7. COMMANDER'S INTENT

a. Developing commander's intent for fire support is an important first step in

accomplishing the essential tasks of fire support. The commander's intent serves to prioritize fire support on the battlefield and focus fire support execution at the critical time and place. Also, the commander's intent for fire support allows the fire support coordinator (FSCOORD) or FSO to properly integrate and synchronize the fire support system into the overall concept of the operation.

b. To be useful, the commander's intent for fire support must be both understood and feasible. This requires a mutual effort by both FSCOORDs and/or FSOs and supported commanders to articulate and understand exactly what fire support can and is expected to accomplish during an operation. The commander's requirements of the fire support system must be within the capabilities of the resources available – adjusted as necessary for mission, enemy, terrain, troops, and time available (METT-T) factors. The FSCOORD or FSO must know and communicate fire support capabilities, limitations, and risks during the process of developing commander's intent for fire support. The expertise and experience of FSCOORDs and FSOs are critical factors in this process.

c. There are certain questions that should be answered to ensure that fire support is coordinated with maneuver. Some of the questions will be answered by the commander. However, most of the information will come from the various maneuver staff sections, the FA unit, or the FSO's own expertise and experience. The following are some questions to determine the commander's intent for fire support.

> ***NOTE:*** Questions should be submitted to the commander in the form of recommendations for his approval.

- What is the offensive (or defensive) mission?
- What are the scheme of maneuver and/or plan for the defense and the commander's intent?
- How are firing units to maneuver within the task force sectors?
- What is the zone of action?
- What is the enemy situation?
- What are the known and/or suspected enemy locations?
- What are the most likely avenues of approach?
- Where are the designated engagement areas?
- What units are to receive priority of fires?
- What fire support assets are providing the priority fires?
- What are the priority targets?
- When is priority shifted to the next priority target?

- Where are special fires to be planned (smoke, illumination, family of scatterable mines [FASCAM], Copperhead, and so forth)?
- Is there a requirement to adjust smoke or illumination targets?
- Is there a requirement to register fire support assets?
- How are fire support vehicles to be used?
- How are combat observation/lasing teams (COLTs) to be employed?
- What are the ground/vehicular laser locator designator (G/VLLD) and Copperhead codes?
- What are the signals or events to commence special fires?
- What maneuver control measures have been established?
- Are any restrictive fire support coordinating measures required?
- What additional fire support assets have been allocated (attached and/or in support) (TACAIR, NGF, Army aviation)?
- Are there any peculiar communications requirements?
- Are scouts forward? What are the fire support requirements for the scouts?
- What are the future plans?
- What is the succession of command?
- How much time is available?
- When is the rehearsal?
- What type and how much mortar ammunition is available?
- For the tactical fire direction system (TACFIRE), what are the defeat criteria for different targets?
- What are the high-payoff target priorities for fire support?
- Where are the obstacles? How are they to be covered?
- What is the breaching plan?
- Have final protective fires (FPFs) been allocated? Where are they to be planned? Are they to be adjusted?
- What are the primary and alternate signals to fire the FPFs?
- How will logistical support for mortars be accomplished?
- Who will control and/or position mortars?

1-8. PLANS

a. Fire Support Plan. Paragraph 3a(2) (Fires) of the maneuver operation order (OPORD) gives the scheme of fires to support the overall concept of operation. The FSCOORD or FSO normally writes this paragraph and ensures it is personally approved by the

commander. The FSCOORD or FSO is also responsible for preparing the Fire Support paragraph of the OPORD, which may include portions on air support, nuclear and chemical fires, naval gunfire, offensive EW, and field artillery and mortar fires. These two paragraphs and the supporting annexes (if any), target lists, schedules, matrixes, or other documents make up the fire support plan. The OPORD format is shown in Figure 1-1. At battalion and lower, a formal written OPORD is often not produced. A fire support plan at this level may be an operation overlay with written instructions, a fire support execution matrix (FSEM), and a target list. At brigade and higher levels, annexes, appendixes, and tabs (Figure 1-2) are normally written to give more details concerning information in the OPORD.

Figure 1-1. **OPORD FORMAT**

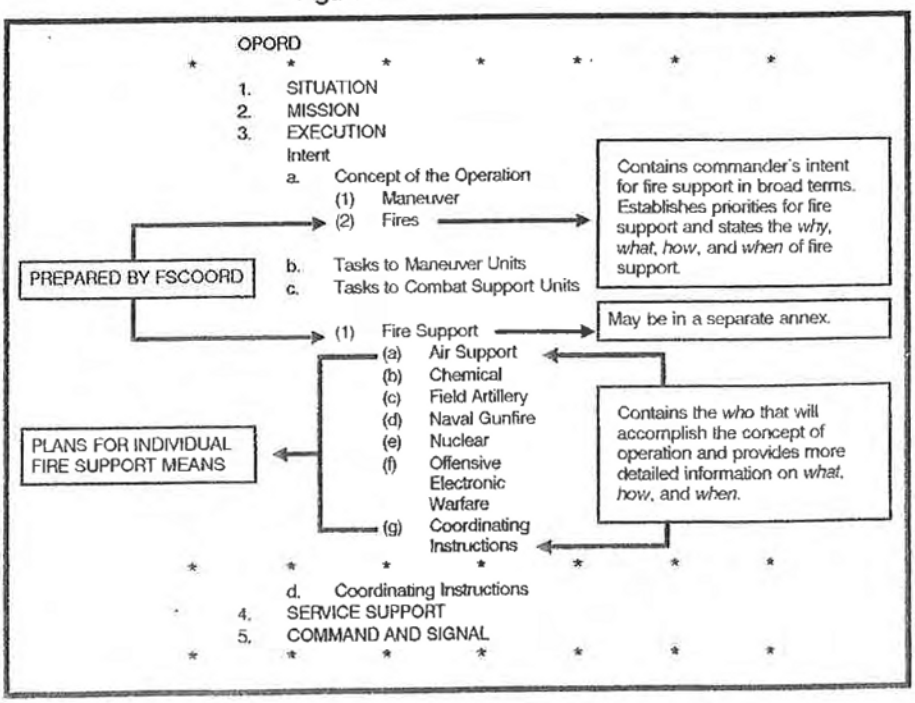


Figure 1-2. **ANNEXES, APPENDIXES, AND TABS TO OPORD**

* * * * * * *

ANNEXES:
- A -- Task Organization
- B -- Intelligence
- C -- Operation Overlay
- D -- Movement Order
- E -- Fire Support
  - APPENDIXES:
    - 1 -- Air Support Plan
    - 2 -- Chemical Support Plan
    - 3 -- FA Support Plan
      - TABS:
        - A -- Target Acquisition
        - B -- Target List
        - C -- Preparation Schedule
        - D -- Scheduled Groups
        - E -- Scheduled Series
        - F -- TACFIRE
        - G -- Survey
    - 4 -- Nuclear Support Plan
- F -- Engineer
- G -- Service Support
- H -- Communications and Electronics

NOTE: Figure 1-2 is an example only. Normally, annexes, appendixes, tabs, and enclosures are assigned letter or number designations based on the sequence in which they are mentioned in the basic plan or order. Also, units may standardize letter or number assignment in their tactical standing operating procedure (SOP). Although no format is prescribed in FM 101-5, annexes, appendixes, tabs, and enclosures normally follow the five-paragraph OPORD format when appropriate. Matrix formats are often used as well.

b. Quick Fire Plan.

(1) In fire support operations, a quick fire plan contains all the necessary elements; however, it is prepared quickly at a lower echelon with standardized techniques to support a tactical

operation. The techniques are standard and very flexible. A quick fire plan may be originated –

- By a company FSO to support a company.
- By a battalion FSO to support a task force.
- By a direct support FA battalion commander and/or brigade FSO to support a brigade.

(2) The quick fire plan, like all fire support plans, is approved by the maneuver commander. As in deliberate planning, the FSO develops targets and assigns target numbers to them. In quick fire planning, however, the FSO assigns targets (and possibly a schedule of fires) to the most appropriate fire support means available to support the operation. In fast-moving situations, targets may be developed and/or planned by the battalion FSO and passed to the company FSOs. The battalion FSO coordinates fires, while the company FSOs orchestrate the fire plan. In this type of fire support planning, the available time usually does not permit evaluation of targets on the target list and consolidation with targets from related fire support coordination agencies. In an operation for which quick fire planning is conducted, an FA battery may be directed to provide fire support to a maneuver force. This direct relationship simplifies planning and coordination between the FSO and the battery commander and/or fire direction center (FDC).

(3) Figure 1-3 shows an example of a completed quick fire plan using DA Form 5368-R (Quick Fire Plan). The scheduling work sheet is on the reverse side of the DA Form 5368-R.

(4) Table 1-3 shows the sequence of actions and possible concurrent activities during the planning and preparation of a quick fire plan. The table is based on actions of a battalion commander and his FSO, but the sequence is similar at all levels.

Figure 1-3. **EXAMPLE QUICK FIRE PLAN**

QUICK FIRE PLAN

For use of this form, see FM 6-20-40 or FM 6-20-50; the proponent agency is TRADOC.

FIRE PLAN	SUPPORTING	ORIGINATOR	MODIFICATIONS BY
OKLAHOMA	TF 2-64	F34	F34

H-HOUR	SHEET	OF	DATE-TIME GROUP
1700	1	1	1630 A

TARGET INFORMATION

LINE	TARGET NUMBER (a)	DESCRIPTION (b)	LOCATION (c)	ALTITUDE (d)	REMARKS (e)
1	BB4003	MORTAR PLT	607218		CAS/FA
2	BB4004	TRENCH LINE	604215		LINEAR 500 m, HE/WP ATTITUDE 2400
3	BB4005	INF PLT	602217		TF MORTARS
4	BB4006	ANTITANK POSITION	596242		SMK, ON CALL

Figure 1-3. **EXAMPLE QUICK FIRE PLAN (Continued)**

SCHEDULE

LINE	ORGANIZATION (f)	FIRE UNIT (g)	TIMINGS (h) −15 −10 −5 H +5	REMARKS (j)
1	2–39 FA	A	4003 48; 4004 88 (a); 4004 64 (b)	4006 4(d)
2	(155, SP)	B	4003 48; 4004 88 (a); 4004 64 (b)	
3		C	4003 48; 4004 88 (a); 4004 64 (b)	
4	TF MORTARS	SIX 107s	4005 240	
5	CAS	TWO SORTIES	4003 (c)	
6				a) 50% WP b) 50% HE
7				c) BOMBS/RKTS d) WP/HC

LEGEND:

CAS	= close air support	m	= meters	smk	= smoke
HC	= smoke	plt	= platoon	SP	= self-propelled
inf	= infantry	rkt	= rocket	WP	= white phosphorus

Table 1-3. **SUGGESTED SEQUENCE OF ACTIONS FOR PREPARING A QUICK FIRE PLAN**

MANEUVER COMMANDER OR S3	BRIGADE, BATTALION, OR COMPANY FIRE SUPPORT OFFICER OR FORWARD OBSERVER	DS BATTALION S3 OR FIRING UNIT
1. Briefly describe operation.	2. Inform DS battalion S3 by situation report and warning order.	3. Inform DS battalion commander, and assess brigade priorities.
4. Position mortars and FACs.	5. Position COLTs, FISTV, and/or observers.	6. Send availability of firing units and ammunition. Begin positioning.
7. Provide detailed description of operation.	8. Assess supportability of operation, and inform maneuver commander.	
	9. Recommend guidance on attack of targets.	
	10. Brief observers.	
11. Position mortars as necessary.		12. Position firing units as necessary.
		13. Send time check to FSO and firing units.
	14. Give time check to maneuver command, aviation, mortars, and FAC.	
16. Begin production of target data for firing units.	15. Send target information to mortars, TACAIR, aviation, artillery, and NGF.	17. Begin production of target data for firing units.
19. Prepare mortar ammunition in sufficient quantities.	18. Send schedule of targets to artillery and mortars.	20. Prepare ammunition in sufficient quantities.
21. Mortars and/or TACAIR report **READY** on fire plan.	22. Brief company FSO and FOs.	23. Report **READY** on fire support plan.
	24. Tell maneuver commander **READY** on fire support plan.	
Participate in rehearsals.	25. Rehearse with all participants.	Participate in rehearsals.
	26. Review fire support plan, and modify as necessary.	
	27. Join maneuver commander to control fire support plan, or go to designated location.	

LEGEND: FAC = forward air controller FISTV = fire support team vehicle FO = forward observer

(5) When the FSO has developed the quick fire plan, he must get the maneuver commander's approval and forward the plan to the appropriate fire support agencies. The following is a suggested distribution:

- Maneuver commander.
- Mortar FDC.
- FA FDC.
- Air liaison officer (ALO).
- Naval gunfire liaison officer or supporting arms liaison team (SALT) officer.
- Army aviation liaison officer (if present).
- FIST.
- COLT.
- Higher and/or lower FSEs.

(6) Once the quick fire plan has been developed, approved, and distributed, the FSO must monitor the progress of the operation and be prepared to change the original plan.

1-9. FIRE SUPPORT PLAN REHEARSAL

a. Rehearsal of any plan is a key element to success of that plan. Rehearsals improve comprehension of the plan. Participants who are unclear on specific portions of the plan gain answers through repetition afforded by war-gaming the operation. In addition to war-gaming possible enemy courses of action, the rehearsal should address other possibilities:

- The use of primary and alternate communications nets.
- Alternate attack systems to be used in the engagement of specific targets.
- Positioning of munitions, observers, and weapon systems.

Whenever possible, the fire support plan should be rehearsed with the maneuver unit's rehearsal. If the maneuver commander does not conduct a rehearsal and time is available, the FSO should conduct a fire support rehearsal by using the existing maneuver OPORD, fire support plan, and FSEM. A rehearsal presupposes a complete plan. It is designed to show whether everyone knows his responsibilities (such as firing a target, moving a firing unit, switching frequencies, or observing a named area of interest) and the cues for the action.

b. Fire support rehearsals should include everyone involved in the fire support plan. This includes the FSCOORD and/or FSO, ALO, naval gunfire liaison officer (NGLO) and/or SALT officer, mortar platoon leader,

chemical officer, forward observers, FISTs, and Army aviation liaison officer, as applicable. The FA battalion S3 will benefit from rehearsals by obtaining information for movement, schedules of fire submitted by the FSOs, munition requirements, and more complete understanding of the operational time involved and of the scheme of maneuver to be supported.

c. The FSEM is ideal for use in the rehearsal, since the rehearsal is normally conducted by performing or reciting the following:

- Actions to occur.
- Possible friendly initiatives.
- Possible reactions to enemy initiatives.
- Control measures.
- Significant events that are to occur in relation to time or phases of an operation.

d. There are many ways to conduct rehearsals. When time is limited, you will not have time to rehearse everything. You must streamline your plan and focus the rehearsal on critical events. Some rehearsal methods are as follows:

- Rehearsal on suitable or actual terrain.
- Model rehearsal.
- Map rehearsal.
- Sand table exercise.
- Radio rehearsal and/or communications exercise.

e. In addition to the fire support plan and maneuver rehearsals, FSOs and FOs also may be key participants in rehearsals of other plans :

- FA support plan.
- Reconnaissance and surveillance plan.
- Communications plan.
- Special situations.

1-10. FIRE SUPPORT COORDINATING MEASURES

The FSCOORD coordinates all fire support impacting in the area of responsibility of his supported maneuver commander, including that requested by the supported unit. He ensures that fire support will not jeopardize troop safety, will interface with other fire support means, and/or will not disrupt adjacent unit operations. Fire support coordinating measures (FSCMs) help him in those efforts. They are designed to facilitate the rapid engagement of targets and at the same time provide safeguards for

friendly forces. All FSCMs are drawn and lettered in black.

a. Permissive Measures.

(1) Coordinated Fire Line. The coordinated fire line (CFL) is a line beyond which surface-delivered conventional or improved conventional indirect fire means may fire within the zone of the establishing headquarters without additional coordination. It normally is established by brigade or higher headquarters. It also may be established by a maneuver battalion operating independently. It is depicted on a map as shown in Figure 1-4.

(2) Fire Support Coordination Line. A fire support coordination line (FSCL) may be established by a corps or an independently operating division within its area of operation to support its concept of the operation. The FSCL is used to coordinate fires of air, ground, or sea weapon systems using any type of ammunition against surface targets. The location of the FSCL must be coordinated with the appropriate tactical air commander and other supporting elements. The purpose of this permissive fire control measure is to allow the corps and its subordinate and supporting units (such as the Air Force) to expeditiously attack targets of opportunity beyond the FSCL. The attack of targets beyond the FSCL by Army assets should be coordinated with supporting tactical air. This coordination is defined as informing and/or consulting with supporting tactical air. However, the inability to effect this coordination will not preclude the attack of targets beyond the FSCL. The interface within the FSE between the various fire support representatives provides an excellent means of initially coordinating the attack of targets in this area. The FSCL is depicted on a map as shown in Figure 1-5.

(3) Free-Fire Area. A free-fire area (FFA) is an area in which any weapon system can fire conventional or improved munitions without additional coordination. Normally, it is established on identifiable terrain by division or higher headquarters. It is depicted as shown in Figure 1-6.

b. Restrictive Measures.

(1) Restrictive Fire Area. A restrictive fire area (RFA) is an area with specific restrictions and in which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. Normally, it is established by battalion or higher headquarters. Restrictions may be listed or referred to in another document. The RFA is depicted as shown in Figure 1-7.

Figure 1-4. COORDINATED FIRE LINE

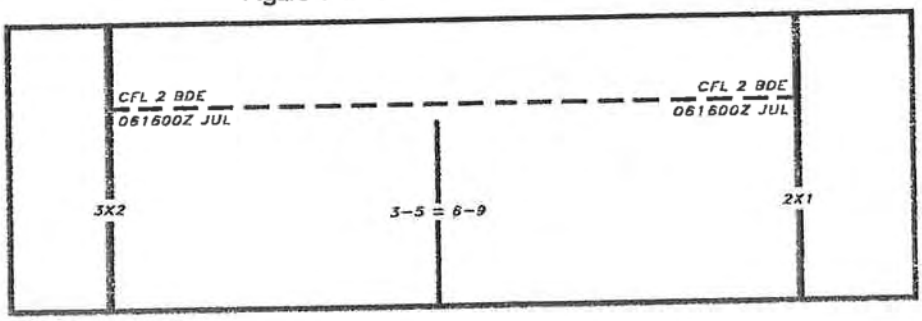


Figure 1-5. FIRE SUPPORT COORDINATION LINE

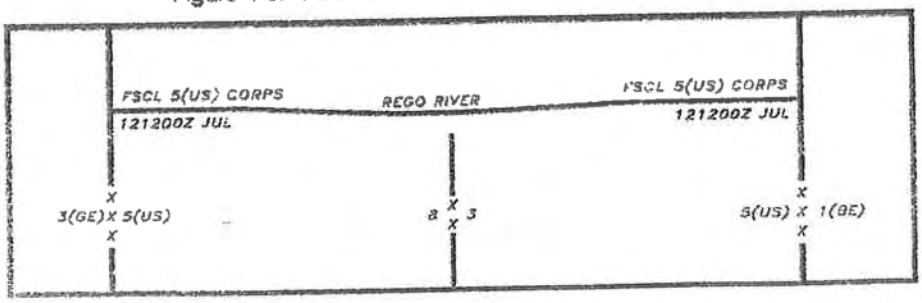


Figure 1-6. FREE-FIRE AREA

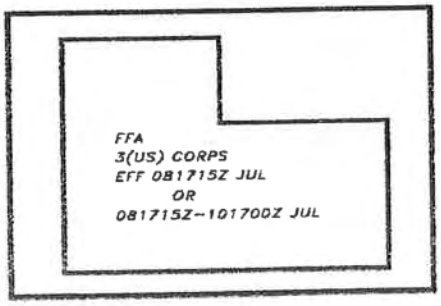
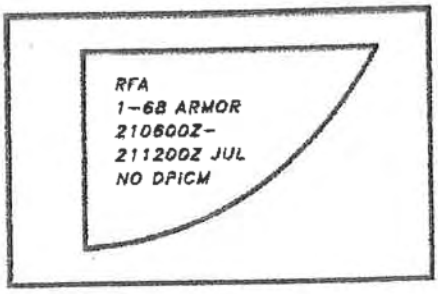


Figure 1-7. RESTRICTIVE FIRE AREA



LEGEND FOR FIGURES 1-4 THROUGH 1-10

div	=	division
DPICM	=	dual-purpose improved conventional munitions
eff	=	effective
hwy	=	highway
Jul	=	July
max	=	maximum
mech	=	mechanized
min	=	minimum

(2) Restrictive Fire Line. A restrictive fire line (RFL) is a line between two converging forces. No fires (direct or indirect) or their effects across the line are allowed without coordination with the affected force. Normally, the RFL is established on identifiable terrain by a commander common to the converging forces. It is depicted as shown in Figure 1-8.

(3) No-Fire Area. A no-fire area (NFA) is an area into which no fires or their effects may be delivered except on a mission-by-mission basis after coordination with the establishing headquarters. Fires are allowed if the unit is attacked by the enemy and if, in the opinion of the senior man (on site), there is no time to coordinate with the establishing headquarters. It is normally established by division or higher headquarters and is depicted as shown in Figure 1-9.

Figure 1-8. **RESTRICTIVE FIRE LINE**

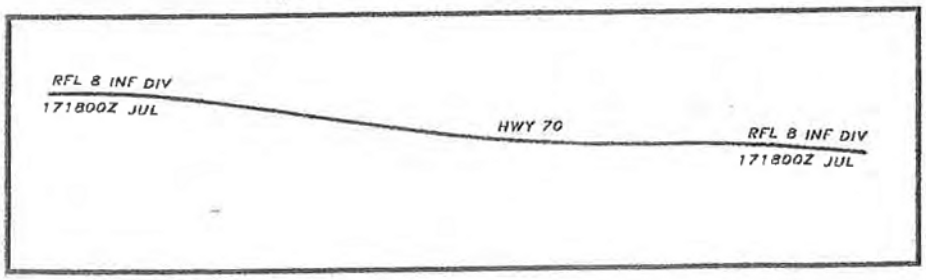
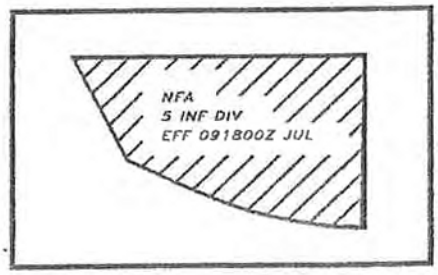


Figure 1-9. **NO-FIRE AREA**



*(4) **Airspace Coordination Area.*** An airspace coordination area (ACA) is a means of providing airspace for the relatively safe travel of aircraft. An ACA facilitates the simultaneous attack of targets near each other by multiple fire support assets to include air and surface-to-surface. The ALO recommends the size. Altitude (alt) is in feet above sea level.

(a) Informal. An informal ACA is most often used and is preferred. It can be established at task force or higher level and normally is not depicted on charts or maps. It can be established by using lateral, altitude, or time separation or any combination of these separations. An informal ACA is normally in effect for a very short time. Usually, the period is only long enough to get aircraft into and out of the target area (3 to 6 minutes). An order not to fire east of the FULDA River from 150900 Mar 91 to 150906 Mar 91 is an example of an informal ACA.

(b) Formal. A formal ACA (Figure 1-10) is a three-dimensional block of airspace that provides lateral and altitude separation between aircraft and other fire support assets. The time it is in effect is usually longer than for an informal ACA. The formal ACA is established by brigade or higher headquarters. The ALO recommends the size. Altitude is in feet above sea level. At brigade level and below, the formal ACA has extremely limited usefulness because of the extensive coordination required.

Figure 1-10. **FORMAL AIRSPACE COORDINATION AREA**

ACA
4 MECH DIV
MIN ALT: 400
MAX ALT: 2700
EFF 080600–080630 JUL

SECTION III
TARGETS

1-11. TYPES OF TARGETS

The term *target* is the most fundamental term used in fire support planning. In fire support operations, a target is personnel, materiel, or a piece of terrain that is designated and numbered for future reference and/or firing. Each target can be classified as either a target of opportunity or a planned target.

a. Target of Opportunity. A target of opportunity is a target that appears during combat and against which fires have not been planned. It can be reached by ground, naval, or aircraft fire.

b. Planned Target. A planned target is one for which fire is prearranged. The degree of prearrangement varies, but some prior arrangement has been made to facilitate its engagement. Planned targets may be further subdivided into scheduled, on-call, and priority targets.

(1) Scheduled Target. A scheduled target is a planned target on which fire is to be delivered at a specific time. This time may be related to an H-hour or another time reference. However, once the reference has been established, the scheduled target will have a definite time sequence.

(2) On-Call Target. An on-call target is a planned target other than a scheduled target on which fire is to be delivered when requested. The on-call target requires less reaction time than a target of opportunity.

(3) Priority Target. A priority target is a target on which the delivery of fires takes precedence over all other fires. A priority target is designated by the supported commander. He also gives the FSCOORD specific guidance as to when it will become a priority target and when it will no longer be a priority target. The commander should state the desired effects on the target and any special types of ammunition to be used; for example, smoke or improved conventional munitions. When not engaged in fire missions, firing units lay weapons on assigned priority targets. Generally, each priority target has a firing unit laid on it.

(4) Final Protective Fire. An example of a priority target in a defensive situation is a final protective fire.

(a) An FPF, in fire support operations, is continuous artillery and/or mortar fires fired on a preplanned target. An FPF is fired to stop and destroy an enemy force crossing into a defensive area. Artillery and/or mortar FPFs should be integrated with the maneuver direct fire FPFs.

(b) An FPF is fired at the maximum rate of fire until the firing unit is requested to stop, ammunition is exhausted, or the firing unit is forced to move.

(c) The brigade commander normally allocates FA FPFs to battalion, which may allocate to company level.

(d) The battalion commander normally allocates heavy mortar FPFs to company level.

(e) Authority to shoot an FPF is that of the lowest maneuver commander in whose area the FPF is placed or his authorized representative.

(f) The FIST has the responsibility to adjust in the FPF when the tactical situation dictates. The FIST may adjust in one gun or all guns designated to fire the FPF.

(g) The FPF is cancelled when it is no longer required.

(h) Table 1-4 gives information necessary in planning final protective fires. The FPF widths in Table 1-4 are neither precise nor restrictive. The sheafs can be opened or closed to cover the specific terrain on which the FPF is located. Table 1-4 is derived from data on the bursting diameter of rounds extracted from various sources. The bursting diameter of an HE round is generally considered to be twice the distance from the point of impact at which the round will reliably place one lethal fragment per square meter of target.

Table 1-4. **FPF PLANNING**

SIZE	TYPE	NUMBER OF MORTARS OR GUNS	APPROXIMATE WIDTH (meters)	APPROXIMATE DEPTH (meters)
120 mm	M285	6 (platoon)	350	60
120 mm	M285	3 (section)	180	60
107 mm	M30	6 (platoon)	250	40
107 mm	M30	4 (platoon)	160	40
107 mm	M30	3 (section)	120	40
81 mm	M29A1	4 (platoon)	140	40
81 mm	M29A1	3 (section)	100	40
81 mm	M252	4 (platoon)	150	50
60 mm	M224	2 (section)	75	30
105 mm	Howitzer	3 guns	105	35
105 mm	Howitzer	6 guns	210	35
155 mm	Howitzer	4 guns	200	50
155 mm	Howitzer	6 guns	300	50
155 mm	Howitzer	8 guns	400	50
203 mm	Howitzer	4 guns	320	80
203 mm	Howitzer	8 guns	640	80

1-12. TARGET SYMBOLS

Standard symbols are used in the preparation of maps, charts, and overlays to identify targets by type (point, linear, rectangular, circular, FPF, or target reference point). These symbols are shown in Figures 1-12 through 1-17. They are keyed to targets on the sample target list work sheet in Figure 1-11.

NOTE: DA Form 4655-R (Target List Work Sheet) facilitates fire planning. It is a preliminary list of all targets and their descriptions from which fire support personnel can select targets for a fire support plan.

Figure 1-11. **SAMPLE TARGET LIST WORK SHEET**

(TF 1-14, 2 BDE, 23d AD OPORD Z)

TARGET LIST WORK SHEET

For use of this form, see FM 6-20-40 or FM 6-20-30; the proponent agency is TRADOC. SHEET 1 OF 1

LINE NO	TARGET NO *a*	DESCRIPTION *b*	LOCATION *c*	ALTITUDE *d*	ATITUDE *e*	SIZE LENGTH *f*	SIZE WIDTH *g*	SORCE/ ACCURACY *h*	REMARKS *i*
1	AA3411	82-mm MORTAR POSITION (4 TUBES)	923435						
2	AA3412	MECH INF IN TRENCH LINE	918560		1600	400	50		
3	AA3413	AIRCRAFT LANDING STRIP	920450		4800	1200	200		
4	AA3414	SUSP REGT CP	947343	(RADIUS 800m)					
5	AA3415	FPF	875689	340	1650	200			TEAM ALFA
6	AA3416	SUSP OP	885670						TRP A3

LEGEND:

AD = armored division
CP = command post
OP = observation post
regt = regiment
susp = suspect
TRP = target reference point

a. Conventional or Point Target. A conventional or point target normally is a target area 250 meters or less in width and length. Minimum accuracy of the target location on the target list is a six-digit grid (AA3411 in Figure 1-11). The symbol for a standard target is as shown in Figure 1-12.

> ***NOTE:*** Any area target with a radius greater than 250 meters is too large to be considered with the graphical munitions effectiveness table (GMET). Also, a target larger than 250 meters will cause the TACFIRE computer to recommend target segmenting.

b. Linear Target. A linear target is one that is more than 250 meters but normally less than 500 meters long; for example, a trench line. Targets longer than 500 meters will require additional fire support assets or will be made into multiple targets. A linear target (AA3412 in Figure 1-11) is designated by two grids or by a center grid, a length, and an attitude. The symbol is as shown in Figure 1-13.

c. Rectangular Target. A rectangular target is one that is wider and longer than 250 meters; for example, a landing strip or a city block. It is designated on the target list by four grids or by a center grid, a length, a width, and an attitude (AA3413 in Figure 1-11). The symbol is as shown in Figure 1-14.

Figure 1-12. **CONVENTIONAL OR POINT TARGET SYMBOL**

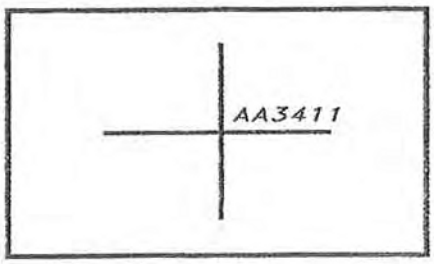


Figure 1-13. **LINEAR TARGET SYMBOL**

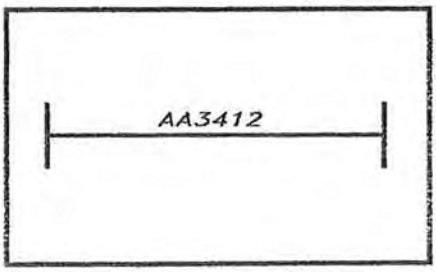


Figure 1-14. **RECTANGULAR TARGET SYMBOL**

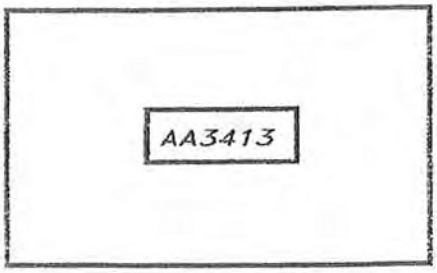


Figure 1-15. **CIRCULAR TARGET SYMBOL**

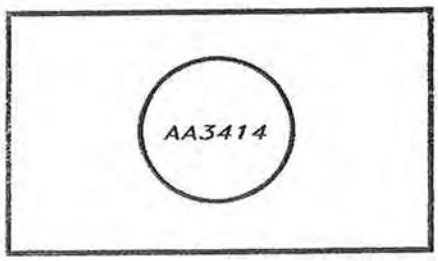
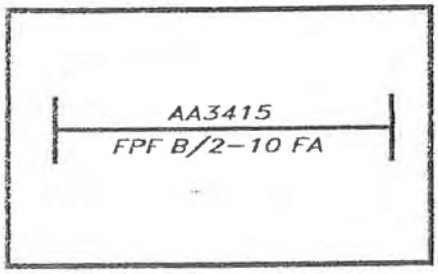


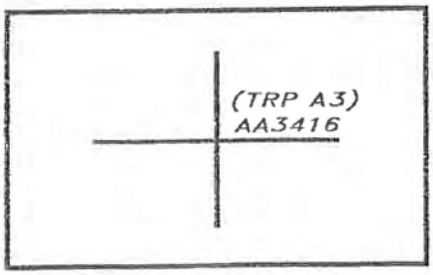
Figure 1-16. **FINAL PROTECTIVE FIRE SYMBOL**



d. Circular Target. A circular target is one that is in a circular pattern or is vague as to exact composition. It is designated by a center grid and a radius (AA3414 in Figure 1-11). The symbol is as shown in Figure 1-15.

e. Final Protective Fire. The symbol for a final protective fire (AA3415 in Figure 1-11) is similar to that for a linear target. It includes the target number and FPF and/or unit to fire. See Figure 1-16.

Figure 1-17. **TARGET REFERENCE POINT SYMBOL**

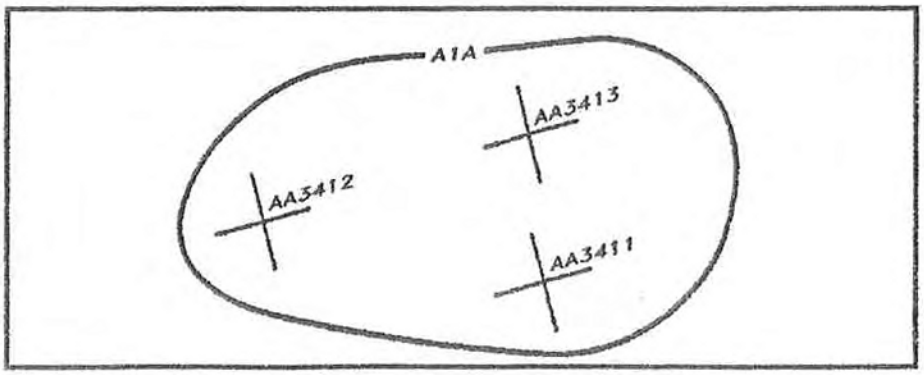


f. Target Reference Point. A target reference point is an easily recognizable point on the ground (either natural or man-made) used for identifying enemy targets or controlling fires. A TRP is usually designated by the company commander or platoon leaders for a company team, platoon, section, or individual weapon. It can also designate the center of an area where the commander plans to distribute or converge the fires of all his weapons rapidly. A TRP is designated by using the standard target symbol and target number issued by the FIST or FSO. Once designated, a TRP also constitutes an indirect fire target. See Figure 1-17.

1-13. MULTIPLE TARGETS

a. Group. A group of targets consists of two or more targets on which the maneuver commander desires simultaneous attack. It is graphically portrayed by circling the targets and identifying them with a group designator (Figure 1-18). This designator consists of the two letters assigned to the maneuver brigade target block with a number between the letters. The numbers should be assigned sequentially as they are used. The number of FA firing batteries and/or battalions available must be considered in planning groups of targets. Including individual targets in a group does not preclude them from being attacked individually.

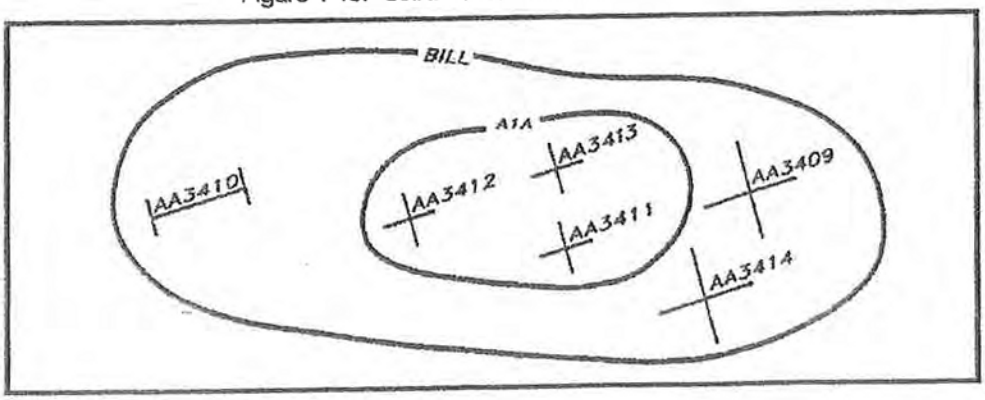
Figure 1-18. **GROUP OF TARGETS SYMBOL**



b. Series. A series is a number of targets and/or groups planned to be fired in a predetermined sequence to support a maneuver operation. A series may also be fired on call, at a specified time, or when a certain event occurs. The maneuver commander determines the need for a series on the advice of his FSO. The series is indicated by a code name or nickname (Figure 1-19). Including individual targets or a group of targets in a series does not preclude these targets from being attacked individually.

c. Program. A program is the predetermined sequential attack of targets of a similar nature. It may be executed on call, at a specific time, or when a particular event occurs. Targets are designated by their nature and are based on the commander's guidance. In a counterfire program, all the targets are fire support related; for example, artillery units, mortar platoons, and contact points. A program is not graphically displayed.

Figure 1-19. **SERIES OF TARGETS SYMBOL**



1-14. TARGET NUMBERING SYSTEM

To designate nonnuclear targets for fire support operations, the Army adheres to the provisions of Standardization Agreement (STANAG) 2934, Chapter 7, and Quadripartite Standardization Agreement (QSTAG) 221. Target designators consist of two letters followed by four numerals; for example, AA1000. This numbering system is used for each corps-size force. A target should be assigned a number when it is received at a fire planning agency. If a target is selected for attack, the most appropriate means of attacking the target (nuclear, chemical, or conventional) will be used, as determined by target analysis. That analysis is guided by the commander's attack guidance and other factors (nature of target, munitions available, and so forth).

a. The two-letter group denotes the originator of the target. The first letter designates a particular nation or a corps associated with a particular nation. The national identifying letters are shown in Table 1-5.

b. Each Army headquarters allocates a first letter to its corps. A corps may be assigned more than one letter. Letters assigned to each nation may be reused as long as that nation's adjacent corps do not share the same letter.

c. The second letter is assigned by corps down to brigade level. Also, second-letter designators are made for corps artillery CPs, corps fire support (FS) cells, division artillery (div arty) CPs, and division FS cells. (See Table 1-6.)

d. Blocks of numbers are assigned by those headquarters having two assigned letters. (See Table 1-7.) Field artillery CPs assign blocks from 0001 to 7999 as needed.

e. A battalion- or squadron-size element with a block of numbers may suballocate numbers as shown in Table 1-8.

f. Target numbers for each unit are normally in the field artillery (corps artillery, div arty, and/or battalion) as well as the maneuver tactical SOPs.

Table 1-5. **NATIONAL IDENTIFYING LETTERS**

NATION	LETTER
Australia	V
Belgium	B
Canada	C, Z
Denmark	D
France	F
Germany	G
Greece	E
Italy	R
Luxembourg	L
Netherlands	H
Norway	N
Portugal	P
Spain	S
Turkey	T
United Kingdom	U, X
United States	A, K, Y, W
AMF (L)	M

LEGEND:
AMF(L) = Allied Command Europe Mobile Force (Land)

NOTE: The letters O and I are not used.

Table 1- 6. **EXAMPLE LETTER DESIGNATORS FOR 12TH (US) CORPS WITH 54TH MECH DIV AND 16TH INF DIV (L)**

ORGANIZATION	LETTER
12th (US) Corps	A
12th (US) Corps Artillery CP	AX
12th (US) Corps FS cell	AY
54th Mech Div FS cell	AA
54th Mech Div Arty CP	AB
1st Bde, 54th Mech	AC
2d Bde, 54th Mech	AD
3d Bde, 54th Mech	AE
Avn Bde, 54th Mech	AF
16th Inf Div (L) FS cell	AG
16th Inf Div (L) Div Arty CP	AH
1st Bde, 16th Inf Div (L)	AJ
2d Bde, 16th Inf Div (L)	AK
3d Bde, 16th Inf Div (L)	AL
Avn Bde, 16th Inf Div (L)	AM

Table 1-7. **ASSIGNMENT OF BLOCKS OF NUMBERS**

NUMBERS	ASSIGNED TO
0001-1999	FS cell or FSE
2000-2999	FSO, lowest numbered maneuver battalion or squadron[1]
3000-3999	FSO, second lowest numbered maneuver battalion or squadron
4000-4999	FSO, third lowest numbered maneuver battalion or squadron
5000-6999	Additional FSOs
7000-7999	FDC, direct support field artillery battalion
8000-8999	Counterfire targets
9000-9999	Toxic chemical targets

[1]Lowest regimental number

Table 1- 8. **SUBASSIGNMENT OF BLOCKS OF NUMBERS**

NUMBERS	ASSIGNED TO
000-199	FSO or FSE
200-299	FIST, Co A
300-399	FIST, Co B
400-499	FIST, Co C
500-599	FIST, Co D
600-699	COLTs
700-799	Maneuver battalion or company mortars or squadron howitzer battery
800-999	As required

NOTE: If additional numbers are needed, company FSOs get them from supervising FSEs.

SECTION IV

MILITARY SYMBOLS AND GRAPHICS

NOTE: For symbols not depicted here, refer to FM 101-5-1.

1-15. BRANCH OR DUTY SYMBOLS

Selected branch or duty symbols are shown in Figure 1-20.

Figure 1-20. **BRANCH OR DUTY SYMBOLS**

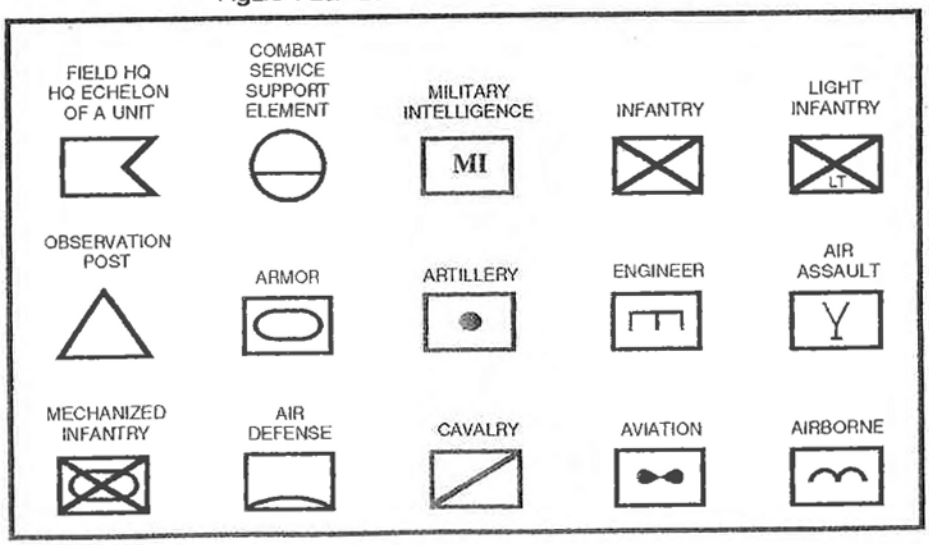
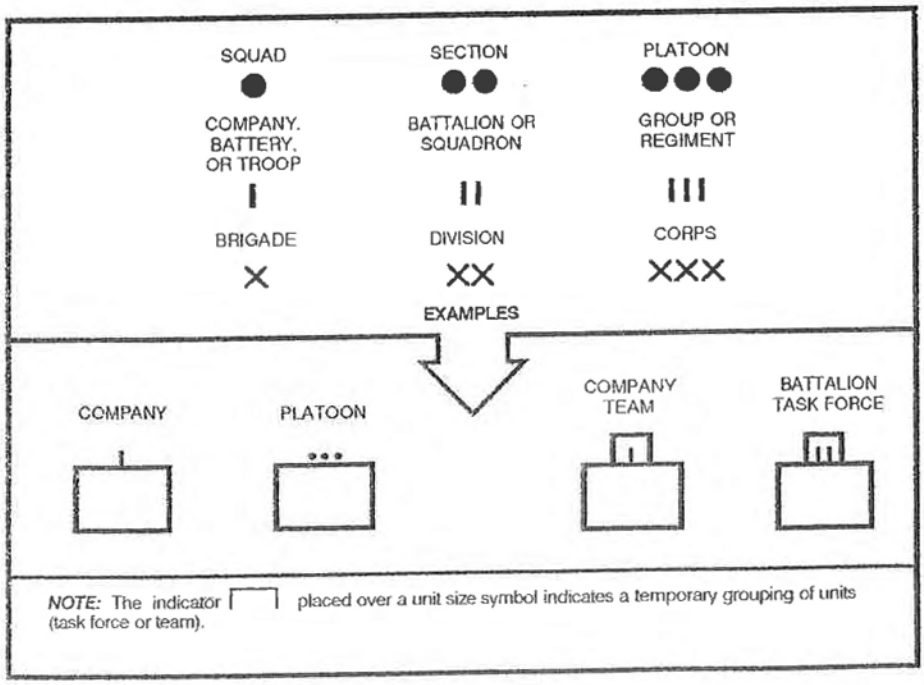


Figure 1-21. **UNIT SIZE SYMBOLS**



1-16. UNIT SIZE SYMBOLS

Selected unit size symbols are shown in Figure 1-21. The unit size symbol is placed over the top of the basic unit symbol.

1-17. EQUIPMENT SYMBOLS

Selected equipment symbols are shown in Figure 1-22.

Figure 1-22. **EQUIPMENT SYMBOLS**

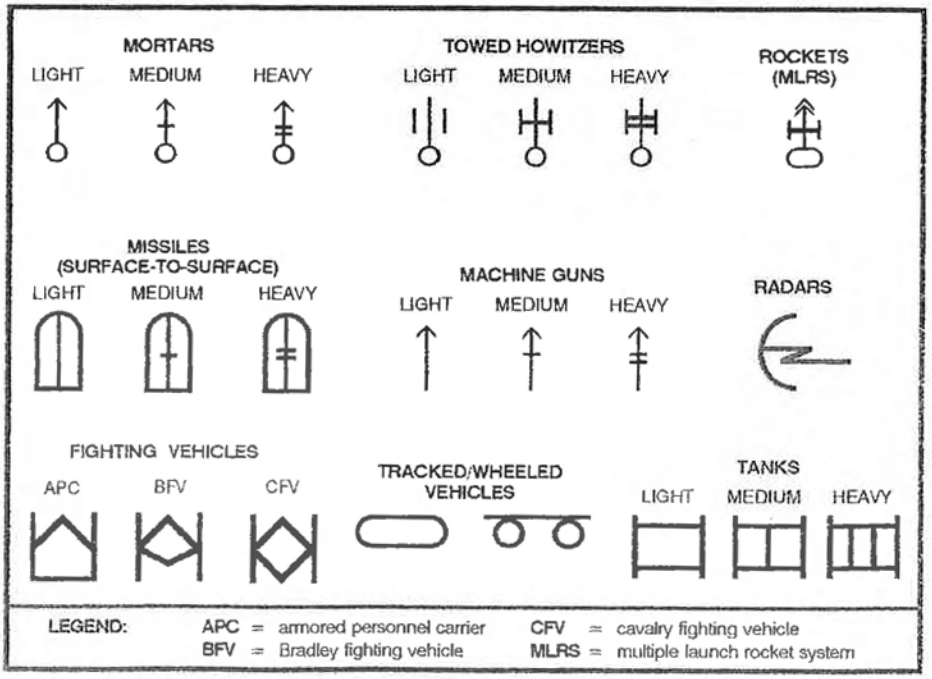
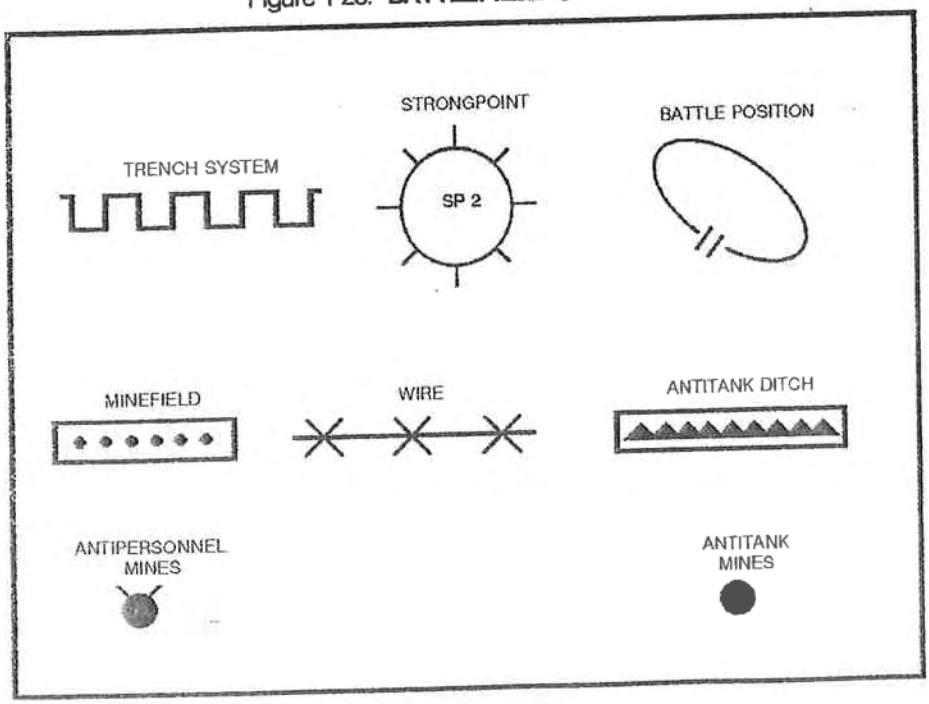


Figure 1-23. **BATTLEFIELD SYMBOLS**



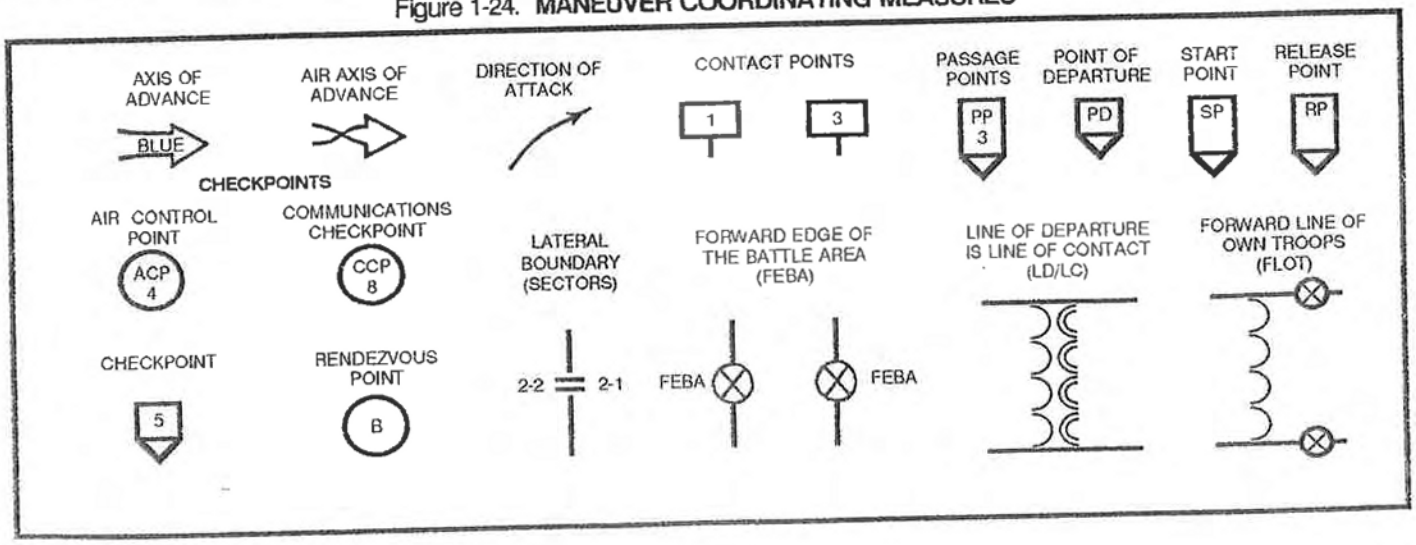
1-18. BATTLEFIELD SYMBOLS

Selected battlefield symbols are shown in Figure 1-23.

1-19. MANEUVER COORDINATING MEASURES

Selected graphics depicting maneuver coordinating measures are shown in Figure 1-24.

Figure 1-24. **MANEUVER COORDINATING MEASURES**



SECTION V
TARGET PRODUCTION

1-20. TARGET-PRODUCING ASSETS

The fire support system consolidates targeting information from many different agencies.

a. The "grass roots" of the target acquisition effort are the FIST and COLT observers and the supported soldiers who aggressively report targeting information. These observers at battalion, company, and platoon levels acquire targets for the entire fire support system by observing the battlefield to detect, identify, and locate targets.

b. Progressing from company level to higher levels in the maneuver chain, more targeting systems are encountered. All intelligence assets produce information that greatly aids fire support targeting. The FSCOORD with the S2 at each level is responsible for ensuring that all available targeting information is used. Target-intelligence-producing assets include the following:

- Remotely employed sensors (REMS).
- Combat outposts.
- Reconnaissance from scouts and patrols.
- Listening posts (LPs) or observation posts (OPs).
- Enemy prisoners of war (EPWs).
- Ground surveillance radars (AN/PPS-5 and AN/PPS-15).
- Target production element (div arty tactical operations center [TOC]).
- Weapons-locating radars (AN/TPQ-36 and AN/TPQ-37).
- Target damage assessments (TDAs) from completed fire missions.
- FIST and/or COLT.
- Local populace and refugees.
- OH-58D (aerial fire support observer [AFSO]).

c. Other targeting assets are discussed below.

(1) Military Intelligence Battalion (CEWI). A particularly important source of potential targeting assets is the divisional CEWI battalion. This unit can listen (intercept), locate (direction-find), and disrupt (jam and deceive) enemy radios. It can also

locate and disrupt enemy radars. By interfacing with the military intelligence (MI) battalion personnel, the FSE or FSCOORD can ensure that these valuable and effective targeting assets are used. Most of the coordination between fire support personnel and MI personnel takes place in the battalion and brigade main command posts through the battlefield information coordination centers (BICCs). Intelligence and electronic warfare (IEW) capabilities are shown in Tables 1-9 through 1-13.

(2) Divisional Aviation Brigade. Aviation brigade assets can provide air reconnaissance and real-time intelligence and targeting data. Primarily because of their reconnaissance mission, aviation brigade assets are often the first forces of the division to locate and establish contact with the enemy. In addition to providing pilot reports, Army aviation assets can also locate and designate targets with lasers in conjunction with high-powered optical systems.

(3) US Air Force Target Acquisition Capabilities. The Air Force has an extensive target acquisition (TA) capability. Its long range makes it a good source of target information for field artillery missiles. US Air Force TA capabilities include the following:

- Pilot reports .
- Photo imagery.
- Infrared imagery.
- Side-looking airborne radar (SLAR).

(4) Crater Analysis. The details of crater analysis and shelling reports (SHELREPs) are in FM 6-50.

LEGEND FOR TABLES 1-9 THROUGH 1-13

LEGEND:	ACR	= armored cavalry regiment	IHFR	= improved high frequency radio	RDF	= radio direction finding
	CM/CB	= countermortar/counterbattery	km	= kilometer	REMBASS	= remotely monitored battlefield sensor system
	COMJAM	= communications jamming	LOB	= line of bearing	TCAE	= technical control and analysis element
	DF	= direction finding	MSE	= multiple subscriber equipment	UHF	= ultrahigh frequency
	FM	= frequency modulated	MTI	= moving target indicator	VHF	= very high frequency
	GSR	= ground surveillance radar	NA	= not applicable		
	HF	= high frequency	noncomm	= noncommunication		

Table 1-9. IEW RANGE CAPABILITIES

PRESENT SYSTEM	RANGE (IN KM)	NAME	REPORTS VIA—	REMARKS
AN/PPS-5	10	GSR	FM from operator	All divisions. Augmented by REMS teams.
AN/TLQ-17A	25+	Trafficjam	FM to CEWI bn TCAE	HF, VHF intercept and jamming. All divisions.
AN/TRQ-32(V1)	20+	Teammate	FM or MSE to CEWI bn TCAE	HF, VHF, UHF intercept. All divisions.
AN/TSQ-114A	25+	Trailblazer	FM, IHFR, or MSE to CEWI bn TCAE	HF and VHF intercept; VHF DF. Heavy division only.
AN/ALQ-151	40+	Quickfix	FM to CEWI bn TCAE	VHF intercept and jam. HF intercept. Mounted in EH-60A aircraft.
AN/MLQ-34	25+	TACJAM	FM to CEWI bn TCAE	VHF COMJAM. Heavy division only.
AN/MSQ-103A	15 to 20	Teampack	FM or MSE to CEWI bn TCAE	Noncomm intercept and LOB. All divisions.

NOTE: Combat information from IEW assets may often be sent directly to IEW support elements (IEWSEs) which are normally collocated at the brigade main CP.

Table 1-10. **IEW CAPABILITIES—BATTALION**

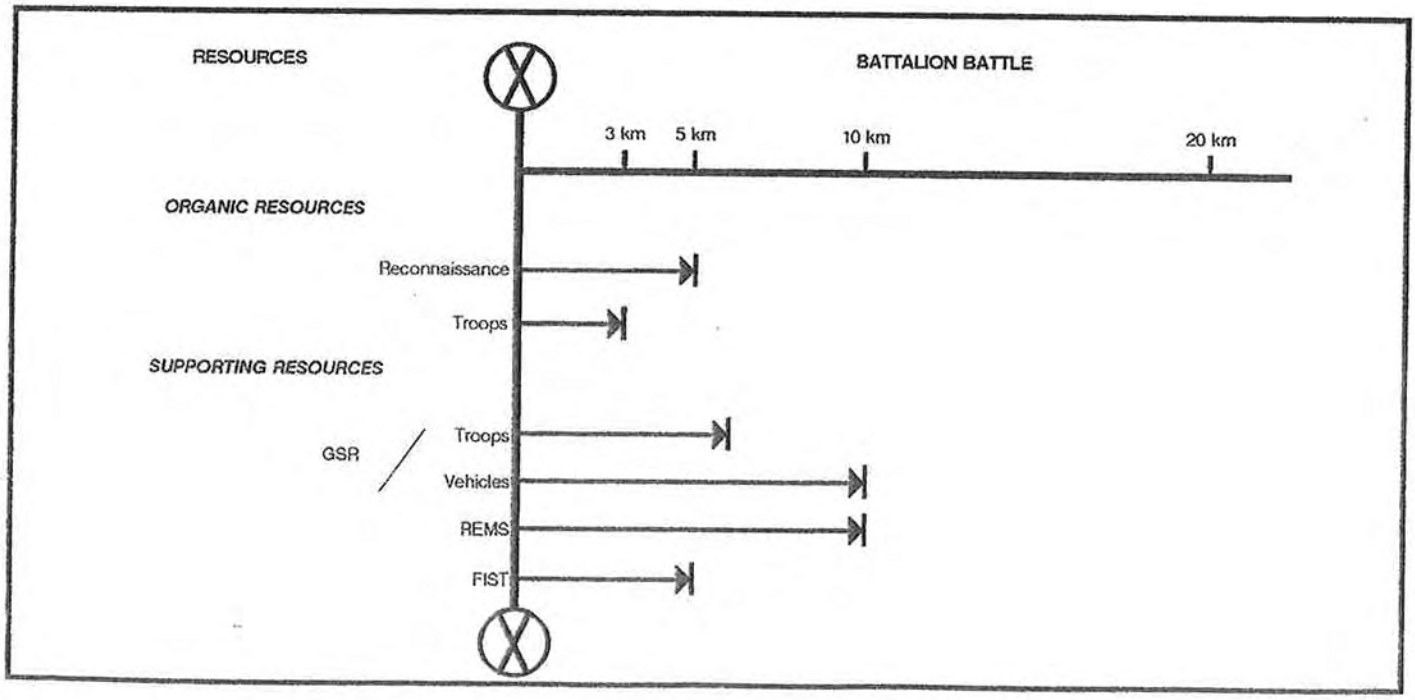


Table 1-11. **IEW CAPABILITIES – BRIGADE**

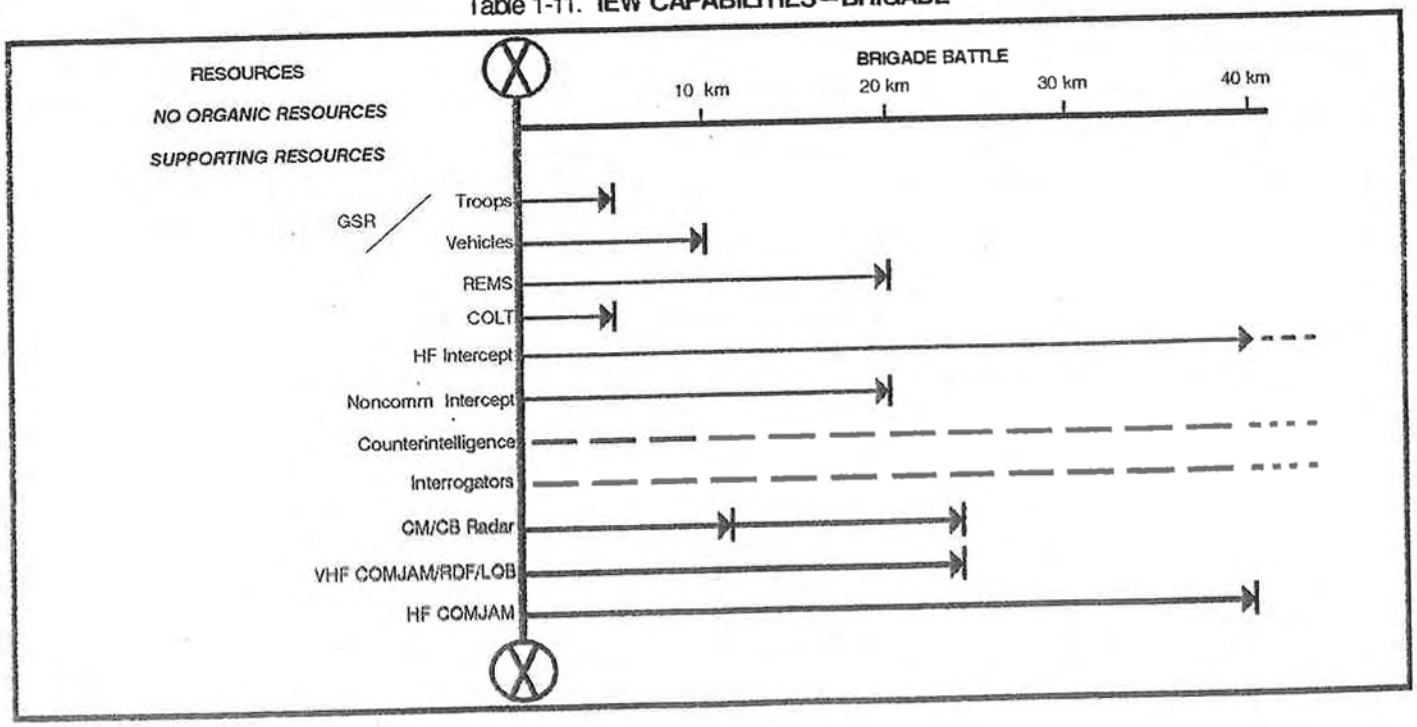


Table 1-12. **IEW CAPABILITIES – DIVISION**

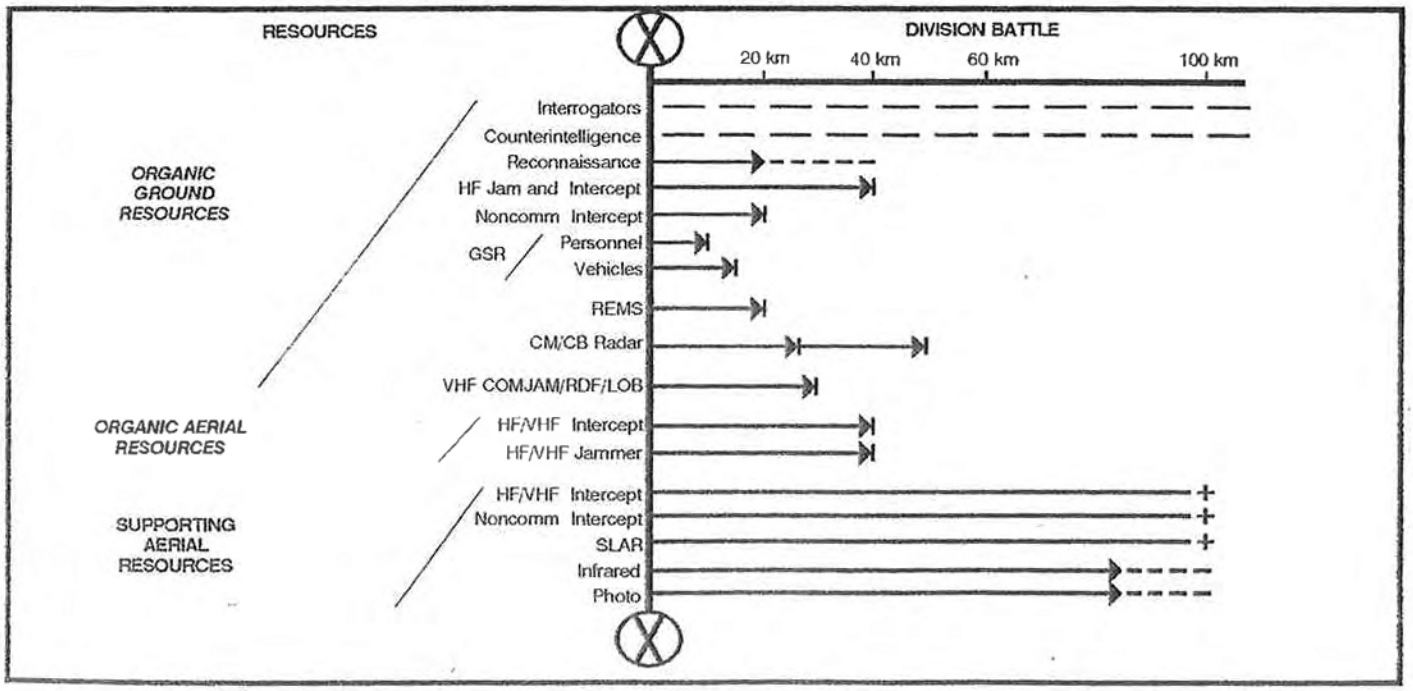
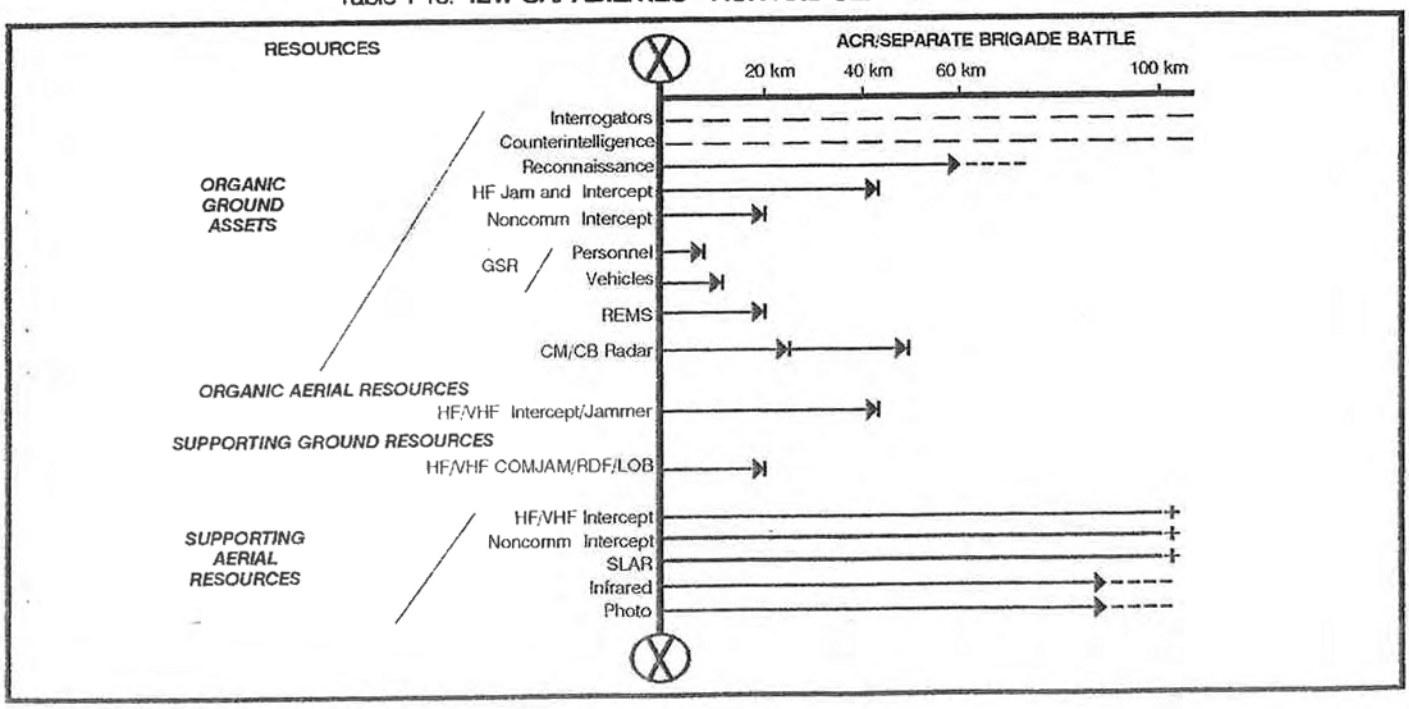


Table 1-13. **IEW CAPABILITIES—ACR AND SEPARATE BRIGADE**



1-21. COMBAT OBSERVATION/ LASING TEAM

a. Description. The COLT is a high-technology observer team designed to provide additional lasing capability on the battlefield for "smart" munitions delivered by FA, Army aviation, Air Force, Navy, and Marine Corps systems. It also provides accurate range, azimuth, and vertical angle to targets for attack with standard munitions by using the G/VLLD. Within the heavy division structure, a COLT is composed of three personnel equipped with a G/VLLD, a fire support vehicle (FSV), three combat net radios (CNRs), and one digital message device (DMD). There will be one or more COLTs per maneuver brigade in heavy divisions. For light forces, current authorizations provide one COLT to each direct support artillery battalion and three COLTs to div arty. The COLT designates for a variety of laser-guided weapons to include Copperhead, Hellfire, laser Maverick, Pave Penny, and Paveway.

b. Employment. The COLTs are positioned by the DS battalion commander or his representative to support the maneuver commander's overall plan. The COLTs assigned to div arty may be task-organized to subordinate artillery battalions or retained centrally. To provide the best coverage and to allow the greatest survivability for the COLT, COLTs often are used in pairs. This allows continuous COLT coverage during an operation. Since the COLT is a limited, valuable asset, careful consideration must precede a decision to decentralize control of COLTs below brigade level.

c. Positioning. To maximize the effectiveness of the COLT while minimizing the employment limitations of the G/VLLD, positioning must be carefully considered. Positioning factors include the following:

- Ability to support the commander's intent.
- Intelligence preparation of the battlefield (IPB) requirements.
- Angle T consideration for each potential firing unit.
- Range of firing unit to expected targets.
- Range of G/VLLD to expected targets.
- Location as near to the flat side of the expected target as possible.
- Survivability of COLT.
- Availability of survey.
- Maintenance of good communications.

d. Environmental Restrictions. Laser designator and acquisition devices are designed to enhance current fire support capabilities. However, there are several factors that can restrict and/or degrade laser use.

(1) Line of Sight. Line of sight must exist between the designator and the target and between the target and the laser acquisition device or laser-guided weapon (LGW).

(2) Clouds. Clouds attenuate laser energy and degrade laser spot tracker (LST) and/or LGW ability to see the spot. Since the laser spot is acquired only after the bomb or missile comes out of the cloud, laser energy acquisition time is short; thus, ballistic accuracy is essential. Typical minimum ceilings and times of flight must be considered.

(3) Darkness. Laser energy transmission is unaffected by darkness; but darkness makes locating, identifying, and tracking targets more difficult for the COLT. The night sights for laser designators enhance operator target identification and engagement during night operations.

(4) Battlefield Obscuration. Smoke, dust, and chemical particles in the air may attenuate or reflect the laser beam. This prevents sufficient energy reflection from the target for lock-on by laser spot tracker or laser-guided weapon. Laser energy reflected from such particles also may present a false target to either the tracker or the munition. As a general rule, if you can see the target through day or night optics, you can successfully designate it. Positioning lasers on flanks or on ground where smoke is likely to be less heavy along the line of sight is a possible consideration.

(5) Concave Targets. Tunnels and other targets that do not reflect laser energy cannot be directly laser-designated. Instead, the designator must be aimed at a nearby surface that will give satisfactory weapons effect. For example, aiming the laser slightly above a tunnel opening would allow a weapon to impact at that critical point. For weapons that tend to miss short, like laser-guided bombs (LGBs), this could guide the bomb to enter the tunnel opening.

(6) Obstructions. Optimum positioning of ground laser designators is essential. Obstructions (trees, limbs, leaves, grass, and so forth) between the designator and the target may prevent a clear, unobstructed view for ground laser designator use.

(7) Temperature Extremes. Extreme temperatures affect battery-powered laser operation. For example, a cold and/or wet battery may have a much reduced capability to power the laser.

(8) Solar Saturation. Laser seekers look for a spot of infrared (IR) energy that stands out from the background. The seeker may detect too much IR energy from the sun at sunrise and just before sunset to be able to discriminate IR energy from a laser designator on the target.

(9) Desert Conditions. Desert atmospheric turbulence can cause a severe degradation in the maximum effective range of laser designators/range finders (LD/Rs). This turbulence is caused by the solar heating and nocturnal cooling of the desert floor, which alters the temperature of the surface and the air above it. The turbulence takes the form of multiple stratified layers of air near the surface and convective thermal plumes. This turbulence affects both ground and airborne laser systems. The degree of turbulence and its effect on lasers will vary during a 24-hour period. Annual variations are small.

e. Designator and Seeker Pulse Code.

(1) Coding for laser designators and seekers is based on pulse repetition frequency (PRF) codes. This system uses either three- or four-digit numbers, 1 through 8 inclusive. Three- and four-digit devices are compatible. When a mix of three- and four-digit equipment is used, the first digit of the four-digit code is always set to 1. For example, a three-digit code of 657 would be set as 1657 on a four-digit code system. To go from a four-digit code to a three-digit code, drop the first number. For example, a four-digit code of 1246 would become a three-digit code of 246.

(2) The joint force headquarters has overall responsibility for code management. Corps FSE controls ground switch settings and provides blocks of switch settings to divisions (div arty). Brigade FSE is the lowest echelon that manages code settings. It ensures that FDCs and lower FSEs have positive coordination of assigned codes. When COLTs designate for Air Force delivery systems, the FAC or ALO receives the designator code from the pilot and then passes it to the COLT. It should be noted that the lower the PRF, the faster the lase pulse and a better "paint" of the target. Therefore, lower codes should normally be assigned to priority COLTs.

(3) Using two or more COLTs in different locations but on the same code offers some advantages in attacking high-priority targets.

f. Offensive Considerations.

(1) Maintaining COLT contact with the enemy may require frequent moves and careful planning to include using COLTs in pairs (overwatching each other's moves).

(2) When Copperhead is used, the distance and angle between the firing battery and the designated target must be considered.

(3) Using the COLT as an independent observer in situations in which laser-guided munitions are not available must be considered.

g. Defensive Considerations.

(1) Consider using the COLT to survey and/or locate obstacles when the COLT is accurately located.

(2) Ensure that COLT positions are high priority in the survey plan.

(3) Consider the distance and angle between the firing battery and the designated target when using Copperhead.

(4) Consider using the COLT as an independent observer if laser-guided munitions are not available.

(5) During periods of limited visibility, consider using the COLT thermal sights for target area observation.

1-22. AERIAL FIRE SUPPORT TEAM

a. Description. The aerial fire support team (AFST) consists of an AFSO and a pilot flying in an OH-58 model helicopter. The OH-58D is the most capable of these helicopters; however, because of its limited numbers and multipurpose utility, the OH-58D may not always be available to AFSOs.

(1) The OH-58D helicopter consists of a modified OH-58 airframe, a mast-mounted sight (MMS), an airborne target hand-over system (ATHS), an attitude and heading reference system (AHRS), and an advanced avionics cockpit. With these systems, the OH-58D has the capability for day or night target acquisition and laser designation well beyond 5 kilometers. These systems also give the AFST an automated digital communications link with artillery systems through TACFIRE.

(2) The AFSO has four missions, all of which he may be required to perform during a flight. The FSCOORD must clearly state the priority in which the missions are to be performed. The four missions are:

- Target acquisition.
- Target engagement (observed fire).
- Fire support coordination.
- Fire support planning.

(3) The AFST has certain limitations.

(a) Smoke, fog, dust clouds, and icing weather can severely degrade OH-58D systems or prevent the OH-58D from flying.

(b) Preflight operations may require 35 to 50 minutes for programming systems.

(c) Crew endurance is limited, and the number of OH-58Ds available is limited. As a result, missions for AFSTs must be well planned and briefed.

(d) Once airborne, the AFSO's ability to perform fire support planning and coordination is limited.

(e) Cross-FLOT missions, when not involved with attack helicopter formations, are high risk.

b. FSO Considerations. The planning and coordination considerations for the FSO upon gaining operational control (OPCON) of an AFSO are described below.

(1) Before arrival of the AFSO, consider the questions below.

(a) What is the duration of the OPCON? Is it for a period of time, a specific mission, or "until further notice"?

(b) What guidance has been issued? Positioning? Orientation? Targets?

(c) Who determines the function of the AFSO? Will the AFSO report priority information requirements directly to div arty or relay them through the battalion that has OPCON? Will the AFSO have a dedicated net in order to maximize the effectiveness of his laser and ATHS?

(2) After arrival of the AFSO, consider the questions below.

(a) What support does the AFSO need? Classes I, III, and V?

(b) Does he understand his function in terms of the questions above?

(c) Are there any conflicts and/or confusion between the AFSO and the unit being supported? If there are, the FSO should resolve them.

(3) During the OPCON, take the actions below.

(a) Help establish and maintain communications channels between the AFSO and the fire support facilities in the area of operations.

(b) Provide current fire support information.

(c) Provide administrative support for fire support planning and/or coordination that may be done by the AFSO. For example, provide maps and current overlays of the area of operation.

1-23. AUTOMATED TARGETING

a. The lightweight TACFIRE (LTACFIRE) and TACFIRE greatly

facilitate the targeting process, since many parts of the process are automated. The focal point of the targeting process in TACFIRE-equipped units is the div arty computer. All target intelligence generated by divisional units is transmitted to div arty and stored in the computer artillery target intelligence (ATI) files. All FSEs down to battalion level have access to the div arty ATI files. Therefore, they have access to all of the division's current target intelligence, regardless of what agency generated it. Detailed target information can be rapidly and accurately transmitted.

b. The commander's guidance can be fed directly into the div arty computer to automatically--

- Select ideal fire support means for engaging a target.
- Calculate required ammunition expenditures to defeat a target.
- Identify priority targets.
- Disseminate critical target intelligence to the appropriate FSEs.

c. Care must be taken to ensure that message-of-interest (MOI) processing delivers targeting information to the critical agency as it is developed. The MOI is established with initializing data to ensure that intelligence-developed targets are sent to the variable format message entry device (VFMED), briefcase terminal (BCT), or FIST DMD of appropriate FSEs.

d. Target criteria delineate how and when targets may be combined. Criteria must be chosen carefully and changed as soon as the situation warrants. Target hardening, survivability moves, and other measures necessitate changes in the target criteria input. Ensure that the target criteria reflect target selection standards (TSSs) and commander's guidance.

SECTION VI
ATTACK OF TARGETS

1-24. MORTAR ATTACK

Table 1-14 provides information on the lethal areas, in square meters, of mortar HE rounds against various targets.

1-25. CANNON ATTACK

Table 1-15 is a guide for cannon attack of typical targets.

Table 1-14. **LETHAL AREAS OF MORTAR HE ROUNDS**

		FUZES	
WEAPON	TARGET	IMPACT	PROXIMITY
60-mm mortar HE (M720) (1 round)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	250 100 1	600 200 25[1]
81-mm mortar HE (M374) (1 round)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	700 300 5	900 600[1] 30
107-mm mortar HE (M329A1) (1 round)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	600 250 5	750 400 35[1]
81-mm mortar HE (M374) (3 mortars, 1 round each)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	1800 1000 10	2400 1500[1] 85
107-mm mortar HE (M329A1) (4 mortars, 1 round each)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	2400 1000 30	2600 1800 150[1]
60-mm mortar HE (M270) (2 mortars, 1 round each)	Standing enemy, open terrain Prone enemy, open terrain Crouching enemy, open position	450 200 5	1000[2] 350 30[1]

[1]Against personnel in open positions, use the lowest angle of fall possible. It gives twice the coverage of the steepest angle of fall.
[2]The M49A1 HE round standard B ammunition for the M224 mortar is only 25 percent as effective as the newer M720 round.

Table 1-15. GUIDE FOR CANNON ATTACK OF TYPICAL TARGETS

TARGET TYPE	OBSERVATION	WEAPON	PROJECTILE	HE FUZE	RESULTS DESIRED	REMARKS
			PERSONNEL			
In open or in foxhole without overhead cover	Observed	All	HE	Proximity, time	Destruction	Massing is required.[1] TOT missions are most effective. First volley is most effective.
		All	HE	Proximity, time	Neutralization	Massing is required except for small targets.
		All	HE	Quick, proximity, time	Suppression	Response time is critical against active targets. Preferred fuze is proximity.
		All	DPICM	NA	Destruction	Massing is required on large targets. TOT missions are most effective.
		All	DPICM	NA	Neutralization	Cannon battery volleys are sufficient.
In foxhole with overhead cover	Observed	All	HE	Quick, delay	Neutralization	Massing is required. TOT missions are most effective. Consider use of WP to drive personnel out of foxholes.
		All	HE	Proximity, time, delay, quick	Suppression	Response time is critical against active targets. Proximity fuze is preferred. Consider use of smoke for obscuration.
		All	DPICM	NA	Neutralization	Massing is required, TOT missions are most effective.
		All	DPICM	NA	Suppression	Consider use of ICM on intermittent basis for increased effectiveness.
In dugouts or caves	Observed	All (preferably 155 mm or larger)	HE	Delay, quick, CP	Neutralization or destruction	Use direct fire or assault fire techniques. Fire HE quick at intervals to clear away camouflage, earth cover, and rubble.
Attacking battery position	Observed	105 mm All	Beehive HE APICM	Time	Destruction	Set fuze to detonate on the ascending branch of the trajectory for close-in defense of battery area.

[1]Targets, regardless of type, with an estimated target radius of greater than 250 meters usually require massing for effective attack.

Table 1-15. GUIDE FOR CANNON ATTACK OF TYPICAL TARGETS (Continued)

TARGET TYPE	OBSERVATION	WEAPON	PROJECTILE	HE FUZE	RESULTS DESIRED	REMARKS
			VEHICLES[2]			
Tanks	Observed	All	HE	Proximity, time	Suppression	Fire projectile HE to force tanks to button up and personnel outside to take cover or disperse. WP may blind vehicle drivers, and fires may be started from incendiary effect on outside fuel tanks. WP or HE fires may obscure adjustment.
	Observed	155 mm	DPICM	NA	Suppression	Massing is effective. DPICM is preferred.
		203 mm	DPICM	NA	Suppression	Massing is effective. DPCIM is preferred.
	Observed	155 mm	FASCAM	NA	NA	Both antitank and antipersonnel projectiles should be used.
	Observed	155 mm	Copperhead	NA	Destruction	
	Direct fire	105 mm	HEP, HEP-T, HEAT	NA	Destruction	
Armored personnel carriers	Observed	All	HE	Proximity, time	Suppression	Force vehicles to button up and personnel outside to take cover or disperse.
	Observed	155 mm	DPICM	NA	Neutralization	Massing is effective.
		203 mm	DPICM	NA	Neutralization	Massing is effective.
		155 mm	FASCAM	NA	NA	See remarks for tanks.
	Observed	155 mm	Copperhead	NA	Destruction	
	Direct fire	105 mm	HEP, HEP-T, HEAT	NA	Destruction	
Trucks	Observed	All	HE	Proximity, time	Destruction	ICM is preferred munition.
		155 mm	DPICM	NA	Destruction	
		203 mm	DPICM	NA	Destruction	

[2]The first objective of firing on moving vehicles is to stop the movement. For this purpose, a deep bracket is established so that the target will not move out of the initial bracket during adjustment. Speed of adjustment is essential. If possible, the column should be stopped at a point where vehicles cannot change their route and where one stalled vehicle will cause others to stop. Vehicles moving on a road can be attacked by adjusting on a point on the road and then timing the rounds fired so that they arrive at that point when a vehicle is passing it. A firing unit or units, if available, may fire at different points on the road simultaneously.

Table 1-15. GUIDE FOR CANNON ATTACK OF TYPICAL TARGETS (Continued)

TARGET TYPE	OBSERVATION	WEAPON	PROJECTILE	HE FUZE	RESULTS DESIRED	REMARKS
				WEAPONS		
Antitank missile	Observed	All	HE	Quick	Suppression	Response time is critical. Intermittent fire may be required. Change to fuze proximity or DPICM for materiel damage if antitank guided missile platform on vehicle is raised.
Air defense:						
Tracked	Observed	All	HE	Proximity, time	Suppression	Smoke may also be used to obscure gunner's line of sight to friendly aircraft. ICM is preferred munition. Consider converged sheaf if weapon is point target and accurately located.
		155 mm	DPICM	NA	Firepower kill	
		203 mm	DPICM	NA	Firepower kill	
Wheeled	Observed	All	HE	Quick	Neutralization	Response time is critical. Intermittent fire may be required.
		All	HE	Quick	Firepower kill	Same as above.
Towed FA mortars, multiple rocket launcher	Unobserved when located by radar	All	HE, WP	Proximity, time	Firepower kill	WP is used to ignite materiel. See personnel targets for results desired.
		All	DPICM	NA	Neutralization	See personnel targets section for results desired. TOT missions are most effective. Massing is usually required.
		155 mm	FASCAM	NA	NA	Use ADAM projectile in conjunction with HE or ICM for sustained effects.
Self-propelled FA battery	Unobserved	All	HE, WP	Proximity, time	Suppression	WP is used to ignite materiel.
		All (less 105 mm)	DPICM	NA	Neutralization	ICM is preferred munition.
		155 mm	FASCAM	NA	NA	Use ADAM projectile in conjunction with HE or ICM for sustained effects.
Surface-to-surface missile	Unobserved	All (less 105 mm)	HE	Proximity, time	Firepower kill	Use converged sheaf if time and target location accuracy permit. TLE in excess of 250 meters requires massing of fires. ICM is preferred munition.
		All (less 105 mm)	DPICM	NA	Firepower kill	Same as above

Table 1-15. **GUIDE FOR CANNON ATTACK OF TYPICAL TARGETS (Continued)**

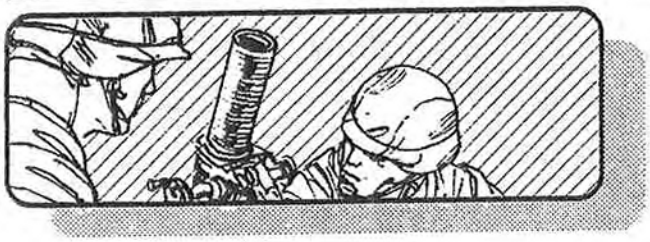
TARGET TYPE	OBSERVATION	WEAPON	PROJECTILE	HE FUZE	RESULTS DESIRED	REMARKS
				BRIDGES		
All bridges	Observed	All (preferably 155 mm or larger)	HE	Quick, CP, delay	Destruction	Direction of fire is preferably with long axis of bridge. Destruction of permanent bridges is best accomplished by knocking out bridge support. Fuze quick is used for wooden or pontoon bridges.
	Observed	155 mm	Copperhead	NA	Destruction	Preferred munition.
				FORTIFICATIONS		
All fortifications	Observed	All (preferably 155 mm or larger)	HE	CP, delay, quick	Destruction	Use highest practical charge in assault and direct fire.
		155 mm	Copperhead	NA	Destruction	Preferred munition.
				MISCELLANEOUS		
Radar	Unobserved	All	HE	Quick, time, proximity	Firepower kill	Use converged sheaf if time and target location accuracy permit. TLE in excess of 250 meters requires massing of fires. ICM is preferred munition.
		155 mm 203 mm	DPICM DPICM	NA	Firepower kill	Same as above.
Artillery command and observation posts	Observed	All	HE	Quick, time, proximity	Suppression	Intermittent fire may be required. HE is preferred munition when response time is critical.
		155 mm 203 mm	DPICM DPICM	NA	Neutralization or destruction	
Command post	Unobserved	All	HE	Proximity, time, quick	Suppression	When target contains personnel and light materiel targets, DPICM is preferred munition.
		155 mm 203 mm	DPICM DPICM	NA	Neutralization or destruction	See above.

Table 1-15. **GUIDE FOR CANNON ATTACK OF TYPICAL TARGETS (Continued)**

TARGET TYPE	OBSERVATION	WEAPON	PROJECTILE	HE FUZE	RESULTS DESIRED	REMARKS
				MISCELLANEOUS (Continued)		
Supply installation	Unobserved	All	HE, WP	Quick	Neutralization or destruction	Large target location errors require massing to ensure target coverage.
Boats	Observed	All	HE	Time, proximity	Suppression	Attack as moving personnel target.

LEGEND:

ADAM = area denial artillery munitions
APICM = antipersonnel ICM
HEAT = high-explosive antitank
HEP = high-explosive plastic
HEP-T = high-explosive plastic–tracer
TLE = target location error
TOT = time on target



CHAPTER 2

FIRE SUPPORT PLANNING AND COORDINATION AT COMPANY LEVEL

2-1. FIRE SUPPORT ASSETS

The available fire support systems at company level normally are mortars, field artillery, naval gunfire, and TACAIR. Depending on the commander's guidance, the company FSO may position mortars. To make maximum use of mortars, he should be aware of their position, range, ammunition status, and capabilities.

If naval gunfire is available, a firepower control team (FCT) will normally come from the air and naval gunfire liaison company (ANGLICO) down to company level to request, observe, and adjust naval gunfire. The ALOs normally are not available at maneuver company level. As a result, FISTs must be able to request, coordinate, and control CAS as required.

2-2. PREPARATION FOR OPERATIONS

a. The company FSO, as the FSCOORD at company level, is responsible for training his teams in all aspects of their duties and for coordinating their activities during operations.

b. He ensures that his teams are fully equipped with all materials and

equipment listed in the local SOP, load plan, and modification tables of organization and equipment (MTOE). These lists normally include such items as binoculars, compasses, maps, coordinate scales, grease pencils, field manuals, radios, DMDs, and combat gear.

2-3. REQUIRED ACTIONS

a. The company FSO must take the following actions on arrival at the battalion command post:

- Turn in the unit battle roster (UBR) to the battalion S1. (This makes FA personnel attached to maneuver if the battalion FSO has not already done this for the artillery personnel under him.)
- From the battalion FSO, obtain situation update and copies of or briefings on plans and orders of the supported unit.
- Obtain status on available fire support delivery systems, survey support, and COLTs.
- Verify fire support coordinating measures in effect.
- Verify unit frequencies, call signs, signals, and markings.
- Obtain information on existing targets, scheduled fires, and known points.

b. The company FSO must take the following actions on arrival at the company CP:

- Obtain a mission briefing from the company commander. This should cover the scheme of maneuver and commander's intent, current enemy situation, and company strength.
- Check for existing target lists.
- Obtain location of FPFs.
- Determine location of company, troop, and/or battalion mortars.
- Obtain status and location of obstacles.
- Make communications check with all fire support means, and give them your location and status.
- Obtain air defense status.
- Obtain current mission-oriented protective posture (MOPP).
- Obtain location of platoons, crew-served weapons, LPs, and OPs.

2-4. FORWARD OBSERVER CONTROL

There are three communications options available to the company FSO. After considering the tactical situation, the degree of training of his FOs, and the availability of fire support assets, the company FSO

determines which option is best suited to provide the best support. Under all options, the company FSO monitors all calls for fire.

a. Option 1 (Decentralized). Platoon FOs may call for fire from fire support assets available. The company FSO has the least positive control; therefore, this option requires a high degree of training of FOs and the company FSO.

b. Option 2 (Predesignated). The company FSO assigns each of the FOs a fire net (and hence a fire support asset). If there are two or more assets (FA or mortars) available, each FO will have his own. Two FOs can be assigned to an asset under this option. If other than the assigned asset is required, the FO will contact the company FSO for assistance.

c. Option 3 (Centralized). Each FO contacts the FIST headquarters with his initial call for fire and is then directed to go to the fire support asset the company FSO determines to be most effective. This option offers the most centralized control, but it is the slowest.

2-5. FIST EMPLOYMENT

The manner in which a maneuver commander organizes and uses his fire support team assets will vary depending on the factors of METT-T. Several options are discussed below.

a. Option 1. The company FSO in the FSV is collocated with the company commander and his vehicle to support the company. He is positioned to support the company scheme of maneuver and to control the indirect fires requested while remaining near the company commander. The FSV should be positioned where the company FSO can effectively observe and control execution of the fire support plan. The company FSO stays with and works out of the FSV. This option allows the company FSO to maintain good control over his FOs, conduct required fire support coordination, and maintain contact with the company commander's vehicle for face-to-face coordination when needed. The FSV should not be immediately next to the company commander's vehicle; rather, it should be within visual range.

b. Option 2. The FSV is positioned to support the company on terrain to maximize the use of the LD/R. The company FSO rides with the company commander in his vehicle. The FSO has a DMD and radio(s) from the FSV. This option allows the company FSO to maintain close coordination with the company commander. However, it may require the use of the decentralized or predesignated method of FO control options or a well-trained fire support

sergeant to conduct the required fire support coordination. The company FSO's ability to observe fires and control the execution of the fire support plan is limited when the FSO is not in the FSV. However, responsiveness and direct coordination with the supported company commander are enhanced.

c. Option 3. The FSV is used as a COLT somewhere within the TF or brigade zone and is controlled by another headquarters. The company FSO rides with the company commander or in another maneuver company vehicle. The company FSO takes with him two radios, the DMD, and a fire support specialist. The commander choosing this option must understand that there may be a degradation of fire support to the supported maneuver company. For this reason, this option is seldom used. Again, the company FSO's ability to observe and control fires is limited.

d. FO Party. The FOs are normally collocated with the maneuver platoon leaders. Commanders may, however, direct artillery FOs to accompany battalion scouts, collocate with ground surveillance radar teams, accompany patrols or long-range surveillance unit (LRSU) operations, or man LPs and/or OPs. Equipped with a DMD or forward entry device (FED), an FO is a primary source of combat information which can be rapidly transmitted through FSEs to artillery command posts. Their use will vary with the factors of METT-T.

2-6. COMPANY FIRE SUPPORT PLANNING

The primary duties of the company FSO in fire support planning are as follows:

- Use the fire support personnel questions for determining commander's intent (paragraph 1-7) to gather information.
- Keep the commander informed of the capabilities and limitations of all fire support systems that may be made available to the company.
- Be familiar with enemy indirect fire capabilities and limitations. Use this information in fire planning to target suspected and likely positions of enemy indirect fire weapons.
- Provide a fire support estimate to the commander. Assist the commander in estimating the situation and in war-gaming to develop his concept of the operation. The company FSO does not wait for the maneuver commander to complete the scheme of maneuver but aggressively inputs fire planning as the scheme of maneuver is being developed to help achieve synchronization. While the commander fights his way through

each action in the war-gaming process to determine factors critical to success, the FSO mentally attacks emerging targets with the most effective system.

- Keep the maneuver commander informed of the status, location, and availability of fire support systems, to include their assigned tactical missions.
- Determine task requirements for all available fire support systems. (It must be emphasized that this process is both oral and informal.)
- Plan fire support in accordance with the concept of operation by establishing targets that facilitate rapid engagement by both trained and untrained observers. Within a company sector, only a few targets are required to provide for responsive, effective fire support. These targets will normally be at least 500 to 1,000 meters apart. The company FSO plans targets on likely enemy avenues of approach and on locations critical to the security of the force. While there is no numerical limit, a company fire support plan of three to five targets is usually enough. A simple fire plan will ensure that the DS FA battalion can execute without problems. It will also ensure understanding of the plan by both fire support and maneuver chains of command.
- Complete the company fire plan by resolving duplications and assigning target numbers. Brief the company commander to obtain his approval.
- Pass targets to the battalion FSE as soon as possible.
- Brief FOs on the fire plan, and provide an FSEM to each platoon and to the company headquarters.
- Continue to modify and update target lists and the FSEM as the situation develops. Include priority targets if allocated by the battalion FSE.
- In defensive operations, plan FPFs to stop enemy movements across defensive lines or areas. Planned FPFs must be integrated with the commander's defensive plans. Authority to call for the FPFs is normally retained by the supported company commander or platoon leader in whose area the FPFs are located.
- Give guidance to observers to ensure they understand their respective areas of responsibility, trigger points, assigned communications nets, call signs and frequencies, G/VLLD codes, DMD addresses, and so forth.

- Ensure that late-breaking intelligence or spot reports are considered in the development of the fire support plan to keep it current with the situation. Be prepared to develop a quick fire plan if needed.

2-7. COMPANY FIRE SUPPORT COORDINATION AND EXECUTION

The company FSO's primary duties in coordinating and executing fire support are as follows:

- Establish and maintain communications with FOs, battalion FSO-FSE, and mortar and artillery units as required.
- Prepare and disseminate fire support documents.
- Monitor status of fire support assets available.
- Receive and act on priorities for fire support requested by the maneuver commander.
- Rehearse the fire support plan with all participants.
- Execute the fire support plan.
- Provide for positive clearance of fires. Ensure the safeguarding of friendly elements.
- Cue target acquisition assets as required.
- Manage lasing operations.
- Anticipate changes dictated by the developing battle, and recommend revision of the fire support plan if required.
- Continually locate and coordinate the attack of targets within the supported unit's zone of action.
- Call for, adjust, and/or direct all types of fire support as required.
- Aggressively prepare and send reports and information to the battalion FSO-FSE and firing unit headquarters as necessary.
- Be prepared to operate the G/VLLD (targeting station), FIST DMD (communications station), or FSV if necessary.
- Be prepared to assume command or control of the company team during battle.

2-8. FIRE SUPPORT EXECUTION MATRIX

The FSEM is a concise, easy planning tool which shows the many factors of a complicated fire support plan. It helps the FSO and the commander understand how the fire plan supports the scheme of maneuver. It is a valuable planning tool for both the offense and the defense. It explains what aspects of the fire support plan

the FSO and each FO are responsible for and at what phase during the battle these aspects apply. When approved, the matrix becomes the primary execution tool. The matrix is set up with the maneuver elements or target executors along the left side and maneuver control measures (phase lines, events, or times) of the mission along the top. Phases should always correspond to phases established on maneuver execution matrixes. Format of and information in FSEMs will vary from unit to unit. Tactical SOPs should standardize FSEM preparation to ensure synchronization with maneuver matrixes.

a. At company level, the information to go in each box includes the following:

- Priorities of indirect fire support to a platoon, indicated by an abbreviation of that fire support asset, appear in the upper left corner of the appropriate matrix box.
- The acronym *FPF*, preceded by the type of indirect fire means responsible for firing that FPF, appears in the center of the box.
- Priority targets allocated to a platoon appear in the box as PRI TGT, preceded by the means of fire support responsible for engaging the target and followed by the target number.
- If FIST elements are responsible for initiating specific fires, the target number, group, or series designation should be listed in the box for that FIST element. Specific guidelines concerning fires not included on the target list work sheet are included in that box.
- Each fire support coordinating measure to be placed in effect, followed by a word designated for that measure, may be shown in the box. For ACAs, the time that planned TACAIR or attack helicopters are due on station is listed.
- Other factors that apply to a certain platoon during a specific time frame may be included in the appropriate box. General guidance may be issued in the written portion of the operation order.

b. Figure 2-1 is an example of a completed FSEM for a company deliberate attack. In the assembly area (AA), a field artillery FPF is allocated for 1st and 2d Platoons. The 2d Platoon has priority of mortar fires from the LD/LC to Phase Line (PL) WELLINGTON. From PL WELLINGTON to PL JACKIE, 1st Platoon has been allocated a mortar (mort) priority target designated AC1212. The 3d Platoon has been allocated an artillery priority target.

AC1234. On the objective, Series PIANO is to be fired by the artillery for 3d Platoon.

c. Figure 2-1 shows a recommended way to label the fire support execution matrix for easy reference. Columns are identified by letters, and lines are identified by numbers. For example, MORT is shown in block C-2. This matrix reference system allows the FSO to easily disseminate the original matrix or update matrix data via radio or wire to all appropriate agencies.

d. Figure 2-2 shows another example of a completed FSEM for a company team. With this type of format, the FSO can depict execution responsibilities, signal operation instruction (SOI) data, high-payoff targets, and coordinating instructions.

Figure 2-1. **SAMPLE COMPANY FIRE SUPPORT EXECUTION MATRIX, DELIBERATE ATTACK**

	AA	LD/LC	PL WELLINGTON	PL JACKIE	OBJECTIVE
1st PLT	155 FPF		MORT PRI TGT AC1212		3
2d PLT	155 FPF	MORT			2
3d PLT			FA PRI TGT AC1234	SERIES PIANO	1
	A	B	C	D	E

e. The FSEM examples at Figures 2-1 and 2-2 are illustrative only. Format, content, and preparation of matrixes should be tailored to unit needs and standardized in local SOPs.

Figure 2-2. **EXAMPLE COMPANY FIRE SUPPORT EXECUTION MATRIX**

COMMANDER'S INTENT FOR FIRE SUPPORT: *COMPANY OFFENSE*

Smoke on BB1001 to cover our initial movement across the LD. Fire Group B1B on Obj FOX as 2d and 3d Platoons cross PL BLUE. Use BB3109 to help block a counterattack from Hill 333.

TGT #	GRID	DESCRIPTION	TRIGGER POINT	EXECUTION PRIMARY	EXECUTION BACKUP
BB1001	123456	Smoke OP	When 1st Plt is ready to cross LD	1st Plt	FSO
BB1002 (Group B1B)	123567	Suspected inf squad	2d and 3d Plts cross PL BLUE	Co Cdr	2d Plt
BB3108 (Group B1B)	135467	AT position	2d and 3d Plts cross PL BLUE	Co Cdr	2d Plt
BB3109	143335	Road junction	If atk from Hill 333 at 146576	2d Plt	3d Plt
BB2102	136324	Suspected AT position	If receive fire from position	FSO	XO

Figure 2-2. **EXAMPLE COMPANY FIRE SUPPORT EXECUTION MATRIX (Continued)**

HIGH-PAYOFF TARGETS: *ALL AT-5 POSITIONS*

ACTIONS UPON LOSS OF FSO: *XO monitors 4.2 mortar net for fire support coordination*
Plt ldrs switch to FA net or the mortar net to fire missions

	PRIORITY OF FIRE Cross LD		PRIORITY OF FIRE Cross PL Blue		AMMUNITION AVAILABLE TO TF	SOI	DAYS 05	DAYS 06
	FA	MORT	FA	MORT				
CO	1st Plt	1st Plt	2d Plt	2d Plt	FA HE 16 bn 3 rds	FA NET	31.10	45.50
						MORT NET	56.00	44.50
BN	Co A	Co B	Co A	Co B	FA smk 25 min	MORT FDC	D34	W45
BDE	3-37		3-37		Mort HE 22 plt 6rds	FA FDC	F7M33	H6L78
					Mort smk 20 min		K98	P72

COORDINATING INSTRUCTIONS:

1. *Shoot 4.2 mortar smoke on BB1001.*
2. *Group B1B targets are artillery priority targets.*
3. *Shoot immediately any ZSU-23-4 or SA-9 targets.*

LEGEND: AT = antitank; catk = counterattack; cdr = commander; co = company; ldr = leader; min = minute; obj = objective; rds = rounds; XO = executive officer

CHAPTER 3

FIRE SUPPORT PLANNING AND COORDINATION AT BATTALION AND/OR TASK FORCE LEVEL

3-1. PREPARATION FOR OPERATIONS

The battalion FSO, as the FSCOORD at battalion and/or task force level, is responsible for training his own section members and subordinate company FSOs in all aspects of their duties. He also is responsible for providing appropriate SOI, communications security (COMSEC) material, laser codes, maps, overlays, fire plans, SOPs, and other required material. He ensures his subordinates are fully equipped with all materials and equipment listed in the tactical SOP, load plan, and MTOE.

3-2. BATTALION FIRE SUPPORT PLANNING

The battalion FSO's primary duties in fire support planning are discussed below.

a. Use fire support personnel questions (paragraph 1-7) for determining commander's intent to ensure thoroughness in preparing fire support plans and briefings.

b. Assist the commander in estimating the situation and in war-gaming to develop his concept of the operation. The battalion FSO does not wait for the maneuver commander to complete the scheme of maneuver. He aggressively inputs fire planning as the scheme of maneuver is being developed to help achieve synchronization. He does this by mentally employing all fire support assets along a proposed course of action in concert with the maneuver commander's other resources. While the commander fights his way through each action in the war-gaming process to determine factors critical to success, the FSO (as the FSCOORD) mentally--

- Attacks emerging targets with the most effective system.
- Determines the tasks and/or requirements for all available fire support assets.
- Considers proper distribution of assets for close support of maneuver elements.
- Visualizes indirect fire unit movements required to follow the battle flow.
- Positions mortars to support the scheme of maneuver (if authorized).
- Considers logistical needs (especially ammunition) and their impact on the battle.
- Considers the use of fire support coordinating measures.

c. Plan fires in accordance with commander's intent and concept of the operation (preparations, counterpreparations, groups, series, and programs of targets).

d. Plan targets in depth and other targets that were not planned by the company FSOs but are within the battalion zone of action. The battalion FSO begins this fire planning on receipt of the maneuver battalion mission and before the battalion FSO's briefing to the company FSOs or the submission of targets by the company FSOs to the battalion FSO.

e. Coordinate with the FA battalion and task force S2 on all known, suspected, or likely enemy locations; and advise the commander on enemy indirect fire support capabilities and limitations.

f. Consolidate target lists from the company FSOs, resolve duplications, and forward the target lists to the brigade FSO and DS artillery battalion FDC. Target lists from companies should consist of not more than three to five targets. The battalion FSO should plan no more than 10 to 20 targets. If the number of targets is limited, the fire support plan is more manageable and can be better supported than a fire support plan with a lengthy target list.

g. Distribute the consolidated target list to all company FSOs.

h. Coordinate requests for additional fire support when the fire support means available at company level are inadequate.

i. Develop the battalion task force fire support plan, and brief the commander and/or S3 to obtain approval or further planning guidance.

j. Keep the battalion fire support plan current. As intelligence and spot reports are received, ensure that the fire support plan is adjusted as required.

k. Keep the commander informed of the capabilities and limitations of all fire support assets that may be made available to the battalion, and advise him on all fire support matters.

l. Collect information from the various liaison officers, correlate that information, and pass it on to the maneuver commander. As a minimum, this information should include availability of fire support assets (assigned tactical missions), suitability, response time, and assigned priorities. The FSO serves as both the FA liaison officer and the fire support coordinator. The absence of other liaison or staff officers does not relieve the FSO of his responsibility to keep the maneuver commander informed of all available fire support assets and to keep the FA units informed of the battalion and/or TF plans and requirements.

m. Advise and consult with other fire support element representatives. Supervise the operation of the FSE.

3-3. BATTALION FIRE SUPPORT COORDINATION AND EXECUTION

The battalion FSO's primary duties in coordinating and executing fire support are as follows:

- Establish and maintain communication with key personnel, FSOs and FSEs, and units as required.
- Prepare and disseminate fire support documents.
- Monitor status of available fire support assets.
- Receive and act on priorities for fire support requested by the maneuver commander.
- Rehearse the fire support plan with all participants. Participate in other maneuver and field artillery rehearsals as required.
- Establish and operate the FSE in accordance with guidance and SOPs of the supported force commander and the force FA commander.
- Receive and allocate field artillery, mortar, CAS, NGF, aviation, target acquisition, and survey assets as required. Establish and allocate priority targets and priority of fires.
- Execute the fire support plan.
- Provide for positive clearance of fires. Ensure the safeguarding of friendly elements.
- Cue target acquisition assets as required.
- Anticipate changes dictated by the developing battle, and recommend revision of the fire support plan if required.
- Continually locate and coordinate the attack of targets within the supported unit zone of action.

- Coordinate the attack of targets outside the zone of action as required.
- Call for, adjust, and/or direct all types of fire support as required.
- Aggressively prepare and send reports and information to higher and lower FSEs and firing unit headquarters as necessary.
- Be prepared to establish necessary procedures, communications, and capabilities to operate from the forward (tactical) command post or from a position or vehicle forward on the battlefield as required.

3-4. BATTALION OR TASK FORCE SPLIT TOC OPERATIONS

a. A tactical CP may be formed during fast-moving offensive or retrograde operations to maintain communications and facilitate the movement of the main CP. In such circumstances, the commander may designate one of the command post vehicles from the main CP to act as the tactical CP. Some or all of the command group may locate at the tactical CP at various times.

b. The command group consists of the commander and those he selects to go forward to help him control maneuver and fires during battle. It normally includes the FSO, the ALO and/or FAC, and the S3. There is no requirement for these people to collocate. Normally, however, the FSO is either with the commander in the commander's vehicle or in another vehicle collocated with the commander during battle. The FSO may occupy the ALO's vehicle as an option if no other vehicle is available.

c. Given the limited personnel and equipment resources of battalion FSEs, the FSO must carefully consider how to best use his assets if required to man a tactical CP and/or go forward in battle. The FSO should have an FED, a DMD, or a FIST DMD available when not physically in the FSE at the main CP. This will permit digital communications with other FSOs and provide access to LTACFIRE or TACFIRE. Other requirements for vehicles, radios, and personnel should be included in the tactical SOP or passed to the commander in the form of a staff estimate.

3-5. FIRE SUPPORT EXECUTION MATRIX

The FSEM is a concise, easy planning tool which shows the many factors of a complicated fire support plan. It helps the FSO and the commander understand how the fire plan supports the scheme of maneuver.

It is a valuable planning tool for both the offense and the defense. It explains what aspects of the fire support plan each FSO is responsible for and at what phase during the battle these aspects apply. When approved, the matrix becomes the primary execution tool. The matrix is set up with the maneuver elements or target executors along the left side and the maneuver control measures (phase lines, events, or times) of the mission along the top. Phases should correspond to phases established on maneuver execution matrixes.

a. At battalion level, the matrix is used as follows:

- If priority of an indirect fire support means is allocated to a team, it is indicated by an abbreviation of that fire support asset in the upper left corner of the appropriate matrix box.
- If an FPF has been allocated, the acronym *FPF* preceded by the type of indirect fire means responsible for firing that FPF will appear in the center of the box.
- If a priority target is allocated to a team, it will appear in the box as PRI TGT preceded by the means of fire support responsible for firing the target. Once a target is determined as the priority target, the corresponding target number is placed in the box.
- If a certain company FSO is responsible for initiating specific fires, the target number, group (gp), or series will be listed in the box for that FSO. Specific guidelines concerning fires not included on the target list work sheet are included in the box.
- If an ACA is to be put in effect by a particular FSO, the acronym *ACA* followed by the code word designated for that ACA will be shown in the box. Also, the time that planned TACAIR or attack helicopters are due in the area is listed.
- Other factors that apply to a certain team during a specific time frame may also be included in the appropriate box. General guidance may be issued in the written portion of the operation order.

b. Figure 3-1 shows an example of a completed FSEM for a deliberate attack.

(1) In the assembly area, field artillery FPFs are allocated to Teams Tank and B, while Team C is allocated a mortar FPF.

Figure 3-1. BATTALION FIRE SUPPORT EXECUTION MATRIX, DELIBERATE ATTACK

	AA	LD/LC	PL RED	PL BLUE	PL GREEN		
TEAM TANK	155 FPF	FA PRI TGT AC3002	FA GP A3C		MORT SERIES FINISH	MORT FPF	4
TEAM B	155 FPF	MORT B	MORT B MORT PRI TGT AC3008	MORT A PRI TGT AC3125 MORT B PRI TGT AC3225		FA FPF	3
TEAM C	MORT FPF	MORT A	MORT A MORT PRI TGT AC3010	FA GP A6C		FA FPF	2
BN CONTROL		FA GP A4C SERIES JOE	ACA ORANGE CAS TOT 0800	ACA APPLE TOT 0815	FA GROUPS A7C, A8C, A9C ACA RAISIN TOT 0900		1
A	B	C	D	E	F	G	

(2) As the units depart the assembly area toward the LD/LC, priority of FA fires has been allocated to the TF. Group A4C and Series JOE are initiated in accordance with the guidance of the TF commander. If communication with the FSO is lost, unit SOP specifies that the lead team may initiate these fires. The allocation of priorities of fire from the mortar sections remains the same (as shown in the matrix).

(3) As the TF crosses the LD/LC, Team Tank (still in the lead) assumes priority of FA fires and is responsible for firing the priority target, Group A3C. Team B retains priority of Section B mortars with priority target AC3008. Priority of fires for Team C is from Section A mortars, with priority target AC3010. Under TF control is the close air support due in the area at 0800. The TF FSO will place ACA ORANGE in effect when the aircraft are attacking their target.

(4) When the lead element crosses Phase Line RED, priority of fires from mortar sections is shifted to Team B, with each mortar section responsible for a priority target. Priority for the FA fires changes to Team C, and the field artillery is responsible for firing Group A6C. Once again, CAS is due in the area. This time, the TOT is 0815 and the ACA is APPLE.

(5) As the TF crosses Phase Line BLUE and begins its final assault on the objective, Team Tank, with priority of mortar fires, initiates Series FINISH. The TF FSO initiates Groups A7C, A8C, and A9C, which are planned to suppress the objective. Also, CAS is due in at 0900, and the TF FSO will initiate ACA RAISIN when appropriate.

(6) Phase Line GREEN is the limit of advance; however, at Phase Line GREEN, priority of fires, FPFs, and the responsibility to initiate certain fires have been allocated (as shown on the matrix) to disrupt the enemy as he withdraws and to protect the TF in case of a counterattack.

c. Figure 3-2 is another example of an FSEM for a battalion task force. Using this type of format, the FSO can depict fire-support-related information for an operation together with the matrix. A format of this type might be used if a formal written OPORD or separate fire support annex was not prepared.

d. The FSEM examples in Figures 3-1 and 3-2 are illustrative only. Format, content, and preparation of matrixes should be tailored to unit needs and standardized in local SOPs.

Figure 3-2. EXAMPLE FSEM FOR A BATTALION TASK FORCE

PHASE/TRIG LINE/PT	PL MACE	PL BOW	PL ARROW	PL BLUE	
TF					
Tm/Co A			BB3401	BB3111 BB0012 ← Mortar Priority →	
Tm/Co B	BB0001 BB3003 ← FA Priority →	BB3001 ← Mortar Priority →			
Tm/Co C			BB3010		
Tm/Co D		BB0007 BB3002	BB0013 BB0009 ← FA Priority →	BB0015 GP B1B	
Scouts	BB0029 BB3004	BB0017			
Mortars	Pos A1, A2	BB3001 Pos B1	Pos B2,C1	BB3111 Pos C2	

FA ORGANIZATION FOR COMBAT	MORTAR POSITIONS	AMMUNITION AVAIL
4-5 FA(155,SP) DS TO 2 Bde	Pos A1 123455 A2 124456 Pos B1 127556	12 bn 3 rds DPICM 20 mort plt 6 rds HE 30 mins arty smoke 20 mins mortar smoke 30 mins arty illum 30 mins mortar illum

Figure 3-2. EXAMPLE FSEM FOR A BATTALION TASK FORCE (Continued)

FIRE SUPPORT COORDINATING MEASURES		TACAIR
CFL: PL BOW O/O CFL: PL ARROW O/O CFL: O/O CFL:	B2 128452 POS C1 131500 C2 130495	4 TF sorties 4 ACAs (#) 20–23 (see ACA overlay)
	BDE CDR ATK GUIDANCE	
FASCAM		HIGH-PAYOFF TGTS
TF Allocation: 2 each 400x400m medium density Planned aimpoints: (1) 195450 200444 (2) 199455 221456	Dest ADA Neut Recon Element Supp AR, Mech Pits	ZSU-32-4, SA-9, MRBs CRP (3 BMP, 1 BRDM) Engineers

COC IS: –A–, –B–, –C–, –D– FSO WITH –A– FSE BEING O/O BN FSE

S DAY-1-	FA DS BN CDR: H70_	A FSO: A99_	FA FDC: _H55_
CF 2: 45.20	BDE FSCOORD: E24_	B FSO: B99_	MORTAR FDC: _U55_
O FD 1: 55.70	BDE FSO: J99_	C FSO: C99_	
I MORTAR: 32.60	BN FSO: Q99_	D FSO: D99_	OIC–O– NCOIC–N–RTO–R–

COORDINATING INSTRUCTIONS:

1. Target allocation: Tm A 3, Tm B 4, Tm C 2, Tm D 4.
2. Cutoff for target submission 052200 OCT.
3. Survey targets for D, A, B, and mortar firing positions. FSOs take survey to next location.

LEGEND:

ADA	=	air defense artillery
AR	=	armored regiment
arty	=	artillery
atk	=	attack
avail	=	available
BMP	=	amphibious infantry combat vehicle
CF	=	command/fire direction (radio net)
COC	=	chain of command
CRP	=	combat reconnaisance patrol
dest	=	destroy
FD	=	fire direction (radio net)
illum	=	illumination
MRB	=	motorized rifle battalion
NCOIC	=	noncommissioned officer in charge
neut	=	neutralize
OIC	=	officer in charge
O/O	=	on order
pos	=	position
recon	=	reconnaissance
supp	=	suppress
tm	=	team
trig	=	trigger point

CHAPTER 4

COMMUNICATIONS

4-1. FIRE SUPPORT COMMUNICATIONS NETS

a. Fire Support Coordination. Fire support coordination nets are as shown in Table 4-1.

b. Fire Direction. The nets used for fire direction are as shown in Table 4-2.

c. Command and Control. The nets used for command and control are as shown in Table 4-3.

LEGEND FOR TABLES 4-1 THROUGH 4-3

avn	=	aviation
btry	=	battery
cmd/ops	=	command/operations (radio net)
mvr	=	maneuver
NCS	=	net control station
ops/F	=	operations/fire (radio net)
TAB	=	target acquisition battery

Table 4-1. **FIRE SUPPORT COORDINATION NETS**

NET	PURPOSE	SUBSCRIBERS[1]
Maneuver battalion fire support net (FM) voice	Calls for fire from non-field-artillery observers Voice fire support coordination between maneuver, FSEs, and field artillery or mortar CPs	Mvr bn FSE (NCS) Mvr bn FSO Mvr co FOs Mvr bn mort FDC/plt ldr FIST HQ or mvr co FSOs Any FDC (as required) COLT(s) (as required) Any FSO or observer Mvr bde FSO
Maneuver brigade fire support net (FM) voice	Voice fire support coordination within the maneuver brigade area of operations	Mvr bde FSE (NCS) Mvr bde FSO Mvr bn FSEs or FSOs Any FSE (as required) DS bn TOC COLTs FSCOORD (as required) Any FSO (as required) Any FDC (as required) Force FA TOC (as required)

[1]Subscribers vary according to the tactical SOP and the factors of METT-T.

Table 4-2. **FIRE DIRECTION NETS**

NET	PURPOSE	SUBSCRIBERS[1]
Maneuver battalion mortar FD net (FM) digital[2]	Tactical and technical fire direction and calls for fire to the mortar plt FDC(s)	Mvr bn FSE Mvr bn FSO Mvr co FOs (as required or directed) Mvr bn mort FDC (NCS) FIST HQ or mvr co FSOs COLT(s) (as required) Any FSO or observer (as required)
Direct support battalion fire direction 1, 2, or 3 net (FM) digital[2]	Tactical and technical fire direction and calls for fire to FA battalion, battery, or platoon FDCs	DS bn FDC (NCS) Plt FDCs FIST HQ or mvr co FSOs (as required or directed) FOs (as required or directed) AN/TPQ-36 radar (as required) COLT(s) (as required) Bn FSE or FSO Mvr bde FSE or FSO Other FSE or FSOs (as required) FA btry FDCs FA plt FDCs
Direct support battalion ops/F net (FM) digital[2]	Tactical fire direction and fire planning	DS bn TOC (NCS) Mvr bn FSEs Mvr bde FSE Avn bde FSE (as required) Other FSE (as required)

[1]Subscribers vary according to the tactical SOP and the factors of METT-T.
[2]These are voice nets in units not equipped with digital devices.

Table 4-3. **COMMAND AND CONTROL NETS**

NET	PURPOSE	SUBSCRIBERS[1]
Maneuver company command or operations net (FM) voice	Command and control of all maneuver company elements	Mvr co CP (NCS) Mvr co cdr Mvr co XO Mvr plt ldrs Other mvr elements (as required) FIST HQ or mvr co FSO FOs (as required)
Maneuver battalion command or operations net (FM) voice	Command and control of maneuver elements in the battalion or TF	Mvr bn CP (NCS) Mvr bn cdr and staff Mvr co cdrs Mvr bn FS or FSO Other mvr elements (as required) Other FSE or FSOs (as required)
Maneuver brigade command or operations net (FM) voice	Command and control of all maneuver elements in the brigade	Mvr bde CP (NCS) Mvr bde cdr and staff Mvr bn CP, cdr, or staffs Mvr bde FSE or FSO DS FA bn CP and FSCOORD Force FA HQ CP (as required) Other mvr elements (as required) Other FSE or FSOs (as required)
Division artillery or force FA command net (FM) voice	Command and control of FA units	Div arty CP (NCS) Div arty cdr and staff Div FSE (main) Div FSE (tactical) DS bn cdrs DS bn CP Mvr bde FSEs Avn bde FSE MLRS btry cdr or FDC TAB cdr and CP Any reinforcing FA units (as required) Any FSE or FSO (as required)

[1]Subscribers will vary according to the tactical SOP and the factors of METT-T.

d. Quick Fire Nets. A quick fire net is established to directly link an observer (or other target "executor") with a weapon system. Quick fire nets may be either voice or digital nets. Quick fire nets within a maneuver brigade are normally established on field artillery or mortar nets. These nets are designed to expedite calls for fire against high-payoff targets or to trigger preplanned fires. Quick fire nets also may be used to execute fires for critical operations or phases of the battle. Linking a COLT or an AFSO with a battery FDC for counterreconnaissance fires or an AN/TPQ-37 radar with the MLRS battery FDC for counterfires are examples. Copperhead missions can best be executed by using quick fire nets. The FSCOORDs and/or FSOs establish quick fire nets and procedures based on the commander's intent and the concept of the operation.

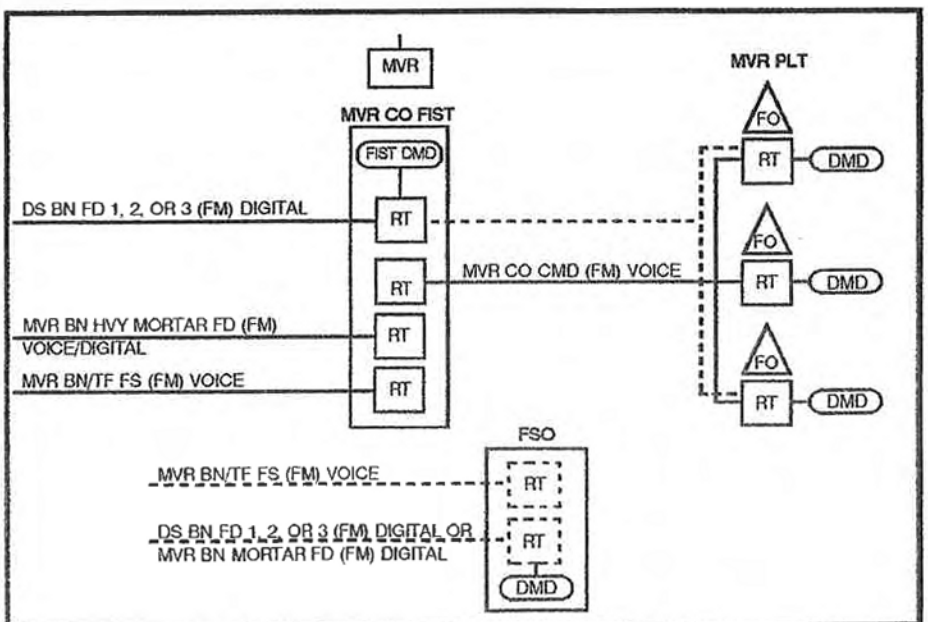
e. Quick Intelligence Nets. A quick intelligence (intel) net may be established to directly link a target acquisition or IEW asset with a command and control headquarters. These nets are designed to expedite the reporting and analysis of selected combat information, which, due to its highly perishable nature or the criticality of the situation, cannot be processed into tactical intelligence in time to satisfy a particular requirement. Priority requirements for either target development or situation development (supporting decision points on the decision support template) may necessitate establishing quick intel nets. The FSCOORDs and/or FSOs and FA units do not normally establish or operate in quick intel nets. Quick intel nets normally are established for human intelligence (HUMINT) or signals intelligence (SIGINT) assets of MI units. These nets normally are not established below brigade level.

4-2. FIRE SUPPORT COMMUNICATIONS NET DIAGRAMS

The diagrams in Figures 4-1 through 4-3 are model solutions. Standard net structures should be outlined in unit SOPs and should be kept current as changes in procedures and/or systems occur.

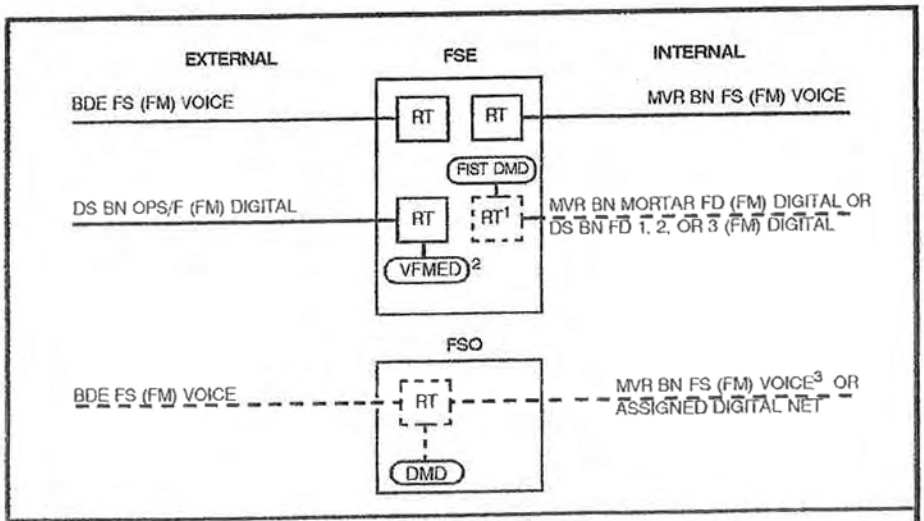
a. Maneuver Company FIST. Communications nets for the maneuver company FIST are shown in Figure 4-1. The FIST headquarters for the light infantry company team will have only three receiver-transmitters (RTs). The maneuver company command net is not monitored if the FSO is collocated with the commander. If the FSO is not with the FIST headquarters, radios will either be provided by the maneuver headquarters or they must be taken from the FIST headquarters. Net assignments for platoon FOs may vary. In some cases, the FSO may decide to have all FOs on the mortar net (voice or digital).

Figure 4-1. **MANEUVER COMPANY FIST COMMUNICATIONS**



NOTE: FOs or FSOs may be equipped with FEDs in Light Forces.

Figure 4-2. **MANEUVER BATTALION FIRE SUPPORT ELEMENT COMMUNICATIONS**

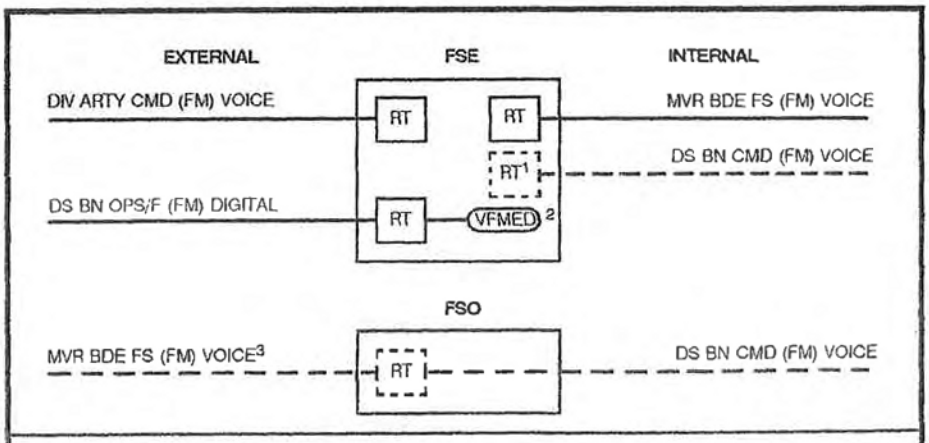


[1]RT is taken or remoted from FSO vehicle
[2]Light force FSEs may be equipped only with a FIST DMD.
[3]Monitors maneuver battalion cmd/ops (FM) voice net when not physically with the maneuver battalion commander.

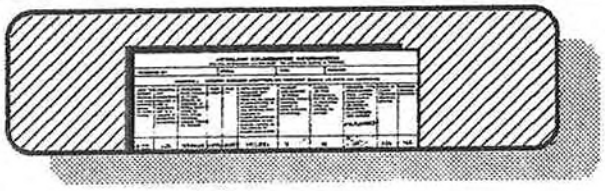
b. Maneuver Battalion FSE. Communications nets for the maneuver battalion FSE are shown in Figure 4-2. In heavy battalion or task force FSEs, the radios in the FSO's wheeled vehicle will have to be mounted in the FSE M577 in order to provide the maximum FM radio capability. If the FSO is required to go forward with the commander or establish a split-TOC capability, radios will be provided by the maneuver headquarters or they must be taken from the FSE. If the FSO uses a DMD when forward with the commander, he must coordinate with the FA battalion FDC in order to operate on one of the FD nets.

c. Maneuver Brigade FSE. Communications nets in the maneuver brigade fire support element are shown in Figure 4-3. In heavy brigades, the radios in the FSO's wheeled vehicle will have to be mounted in the FSE M577 in order to provide the maximum FM radio capability. If the FSO or FSCOORD is required to go forward with the commander or establish a split-TOC capability, radios will be provided by the maneuver headquarters or they must be taken from the FSE. Communications requirements for command and control of brigade COLTs also may require changes to the brigade FSE net structure.

Figure 4-3. **MANEUVER BRIGADE FIRE SUPPORT ELEMENT COMMUNICATIONS**



[1]RT is taken or remoted from FSO vehicle.
[2]Light force FSEs may be equipped with a BCT.
[3]Monitors maneuver brigade cmd/ops (FM) voice net when not physically with the maneuver brigade commander or in the brigade FSE.



CHAPTER 5

REPORTS AND BRIEFINGS

5-1. FIRE SUPPORT STATUS BRIEF

Information concerning the status of fire support resources must be provided to the supported commander. An outline of an example briefing format is as shown in Figure 5-1.

Figure 5-1. **FIRE SUPPORT STATUS BRIEF**

- Artillery organization for combat.
- Artillery and mortar locations and status
  - —Organic and attached.
  - —Direct support and reinforcing.
  - —Target acquisition assets.
  - —FSV, COLT, and AFSOs.
  - —Proposed locations.
- Personnel and equipment status of FSOs and FISTs:
  - —Losses.
  - —Replacements.
- Artillery and mortar fires:
  - —Missions fired, damage assessment.
  - —Ammunition expended.
- Artillery and mortar ammunition status:
  - —Controlled supply rate (CSR).
  - —Required supply rate (RSR)
  - —Ammunition on hand.
- Counterfire information.
- Naval gunfire:
  - —Number and type of ships.
  - —Fire support areas (FSAs) and/or fire support stations.
  - —Missions fired, damage assessment.
  - —Ammunition status.
- TACAIR:
  - —Strikes, damage assessment.
  - —Number of CAS sorties available.
  - —Type of aircraft and/or ordnance available.
  - —Coordination instructions.
- Special munitions:
  - —Prescribed nuclear load (PNL) and/or prescribed chemical load (PCL) for each unit.
  - —Missions fired and/or missions on call.
  - —FASCAM munitions available (express as number and size of minefields).
  - —Smoke available (express as number of minutes and size of area for smoke).
  - —Copperhead available.
  - —Ammunition status.
  - —Status of other special munitions.
- Miscellaneous:
  - —Other fire support means available.
  - —Special communications.
  - —Air defense.

5-2. FIST REPORT

The FSOs must maintain current information on the location and status of observers under their control. Observers report critical information as shown in Figure 5-2.

Figure 5-2. **FIST REPORT**

- Observer identification (ID) (subscriber number).
- Date-time group (DTG).
- Location and altitude (encode).
- Visibility and cloud height
- G/VLLD code (encode)
- FPF (grids) (encode).
- Current status.

5-3. OBSERVER'S NBC 1 REPORT

In the nuclear, biological, chemical (NBC) warning and reporting system, NBC reports are used to record and send information between units and higher headquarters. All fire support personnel should be prepared to send an NBC 1 observer report on request. Figure 5-3 shows the format for the NBC 1 report. (This format is in compliance with STANAG 2103, edition 6, and QSTAG 187, edition 2.)

Figure 5-3. **NBC 1 (OBSERVER'S REPORT)**

TYPE OF REPORT: NBC 1 CHEM, NBC 1 NUC, or NBC 1 BIO

Line

A. Strike serial number (not usually used for NBC 1).
B. Observer's position.
C. Direction of attack from observer (grid or magnetic; degrees or mils).
D. DTG of attack.
E. Duration of illumination (nuclear).
Date-time attack ended (chemical or biological).
F. Location of attack.
G. Means of delivery or kind of attack.
H. Type of burst (air, surface, unknown, height if known).
I. Number of munitions or aircraft (chemical or biological).
J. Flash-to-bang time.
L. Cloud width at H + 5.
M. Cloud angle at H + 10 (top or bottom) (nuclear).
Enemy action before and after attack (chemical or biological).

NOTE: Line items B, D and H and either C or F should always be reported; other line items may be used if the information is known.

5-4. SHELLING REPORT

a. The SHELREP, bombing report (BOMREP), mortaring report (MORTREP), or rocketing report (ROCKREP) is submitted. The information included (Figure 5-4) is in compliance with STANAG 2934, Chapter 13.

Figure 5-4. **SHELLING REPORT**

- Unit or origin (encode).
- Position of observer (encode).
- Azimuth of flash, sound, or groove
- Time from.
- Time to.
- Area affected (encode).
- Number and nature of guns.
- Nature of fire.
- Number, type, and caliber.
- Flash-to-bang time.
- Damage (encode).

NOTE: Elapsed time between impact and sound x 350 meters per second = distance (in meters).

Figure 5-5. **COMPLETED DA FORM 2185-R**

ARTILLERY COUNTERFIRE INFORMATION
(For use of this form, see FM 6-121. The proponent agency is TRADOC.)

RECEIVED BY	FROM	TIME	NUMBER

SECTION I - BOMBER, SHELLER, MORTAR OR ROCKREP (Cross out items not applicable.)

UNIT OF ORIGIN (Current call sign address group or code name)	POSITION OF OBSERVER (Encode if HQ or important OP or if Column F gives info on location)	DIRECTION (Grid bearing of FLASH, SOUND, or GROOVE of SHELL [state which] in mils unless otherwise stated). (Omit for aircraft)	TIME FROM	TIME TO	AREA BOMBED, SHELLED, OR MORTARED (Grid ref [in case] or grid bearing to impact in mils and distance from observer in meters [encoded]) (Dimension of the area in meters by fire radius) or (length and width)	NUMBER AND NATURE OF GUNS (Mortars, rocket launchers, aircraft, or other methods of delivery)	NATURE OF FIRE (Adjustment, fire for effect, or measuring) (May be omitted for aircraft)	NUMBER, TYPE, AND CALIBER (State whether measured or assumed) OF SHELLS, ROCKETS (or MISSILES), AND BOMBS. MEASURED	TIME OF FLASH-TO-BANG (Omit for aircraft)	DAMAGE (Encode if required)
F22	NA	4810 yrs	0545	0547	392841	4 / ARTY	H	8 / HE / 122	NA	NA
A	B	C	D	E	F	G	H	I	J	K

SECTION II - LOCATION REPORT / SECTION III - COUNTERFIRE ACTION

REMARKS	SERIAL NUMBER (Each location that is produced by a locating unit is given a serial number)	TARGET NUMBER (If the weapon or activity has previously been given a target number, it will be entered here)	POSITION OF TARGET (The grid reference or grid bearing and distance of the located weapon or activity)	ACCURACY (The accuracy to which the weapon was located, CEP in meters and the means of location if possible)	TIME OF LOCATION (Actual time the location was made)	TARGET DESCRIPTION (Dimensions if possible): 1. Radius of target 2. Target length and width in meters	TIME FIRED (Against hostile target)	FIRED BY	NUMBER OF ROUNDS, TYPE OF FUZE, AND PROJECTILES
L	M	N	P	Q	R	S	T	U	V

DA FORM 2185-R, 1 APR 90 (Conforms with STANAG 2003) Edition of 1 May 78 is obsolete.

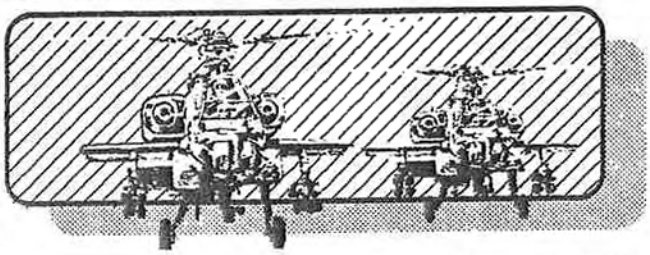
b. A completed DA Form 2185-R (Artillery Counterfire Information) is shown in Figure 5-5.

5-5. SALUTE REPORT

Combat information must be reported in a timely and accurate manner. Forward observers and FISTs are a primary source of combat information. An example of a report for preparing and forwarding combat information is as shown in Figure 5-6.

Figure 5-6. **SALUTE REPORT**

- **SIZE:** The size of the enemy force observed.
- **ACTIVITY:** What the enemy was doing.
- **LOCATION:** Where the enemy was located.
- **UNIT:** The unit to which the enemy belongs—markings on vehicles, distinctive features on uniforms, or special equipment which may identify the type enemy unit.
- **TIME:** When the enemy was observed.
- **EQUIPMENT:** The equipment the enemy wore, carried, or used.



CHAPTER 6

FIRE SUPPORT ASSETS

6-1. MORTARS

Table 6-1 presents capabilities of various caliber mortars.

6-2. FIELD ARTILLERY WEAPONS

Table 6-2 presents capabilities of various caliber field artillery weapons.

6-3. CLOSE AIR SUPPORT REQUESTS

a. There are two types of close air support requests: preplanned and immediate.

(1) Preplanned requests are processed up the Army chain to corps for approval. Immediate requests may be initiated at any level and are processed through Air Force channels.

(2) A request for immediate close air support is processed by the battalion S3 air, FSO, and air liaison officer. A determination is made as to how appropriate the target is for a CAS mission. If the target is determined to be appropriate, the air liaison officer submits an immediate close air support request over Air Force nets. If the request is approved, aircraft will be diverted to attack the target.

LEGEND FOR TABLES IN CHAPTER 6

APERS	= antipersonnel	**MTSQ**	= mechanical time superquick (fuze)	**RPMPG**	= rounds per minute per gun
ATAS	= air-to-air Stinger	**NG**	= National Guard	**TOW**	= tube-launched optically tracked, wire-guided missile
BDA	= battle damage assessment	**PD**	= point detonating	**TV**	= television
CEM	= combined effects munition	**PI**	= probability of incapacitation	**USAF**	= United States Air Force
FFAR	= folding fin aerial rocket	**RACO**	= rear area combat operations	**USMC**	= United States Marine Corps
lb	= pound	**RAP**	= rocket-assisted projectile	**USN**	= United States Navy
MG	= machine gun	**Res**	= Reserve	**VSTOL**	= vertical short takeoff and landing
MT	= mechanical time (fuze)	**RP**	= red phosphorus		

Table 6-1. MORTAR CAPABILITIES

CALIBER	60 mm	81 mm	81 mm	107 mm	120 mm
MODEL	M224	M252	M29A1	M30	M285
MAX RANGE (meters) HE	3,500 (M720)	5,600 (M821)	4,790 (M374A3)	6,840 (M329A2)	7,200 (M59)
AMMUNITION	HE WP Illuminating	HE WP Illuminating RP	HE WP Illuminating	HE WP Illuminating	HE Smoke Illuminating
MAX RATE OF FIRE PER MINUTE, NUMBER OF MINUTES	30, 4	35, 1	25, 2	18, 1; then 9, 5	15, 1
SUSTAINED RATE OF FIRE PER MINUTE	20	15	8	3	5
MINIMUM RANGE (HE) (meters)	70	80	70	770	180
FUZES[1]	PD,VT, time, delay	PD, VT, time, delay	PD, VT, time, delay	PD, VT, time, delay	PD, VT, time, delay

[1]Most HE mortar rounds can be fired with the M734 multioption fuze.

Table 6-2. **FIELD ARTILLERY WEAPON CAPABILITIES**

CALIBER	105 mm	105 mm	105 mm	155 mm	203 mm	155 mm	155 mm	MLRS
MODEL	M102	M101A1	M119	M109A2/A3	M110A2	M198	M114A2	M270
MAX RANGE (meters)	11,500	11,000	14,000	18,100	22,900	18,100	14,600	30,000
AMMUNITION	HE Illuminating HEP-T APICM Chemical APERS WP	HE Illuminating HEP-T APICM Chemical APERS WP	HE Illuminating HEP-T APICM Chemical APERS WP	HE DPICM APICM Smoke Chemical Nuclear RAP FASCAM Copperhead WP Illuminating	HE APICM Chemical Nuclear DPICM RAP	HE DPICM APICM Smoke Chemical Nuclear RAP FASCAM Copperhead WP Illuminating	HE DPICM APICM Smoke Chemical Nuclear RAP FASCAM Copperhead WP Illuminating	DPICM
MAX RATE OF FIRE PER MINUTE, NUMBER OF MINUTES	10, 3	10, 3	6, 2	4, 3	1.5, 3	4, 3 then 2, 30	4, 3	12 rds
SUSTAINED RATE OF FIRE PER MINUTE, NUMBER OF MINUTES	3	3	3, 30 then 1	1, 60 then .5	.5	1 (or as indicated by thermal warning device)	1 (for charge 8, 1 round a minute for 60 minutes, then 1 rd every 3 minutes thereafter)	
RANGE OF RAP (meters)	15,100	14,500	15,100	23,500	30,000	30,000	19,300	
FUZES	PD, VT, MT, MTSQ, CP, delay	PD, VT, MT, MTSQ, CP, delay	PD, VT, MT, MTSQ, CP, delay	PD, VT, MT, MTSQ, CP, delay	PD, VT, MT, MTSQ, delay	PD, VT, MT, MTSQ, CP, delay	PD, VT, MT, MTSQ, CP, delay	Electronic time

b. A CAS request at company level includes the information shown in Figure 6-1.

Figure 6-1. **EXAMPLE MINIMUM INFORMATION REQUEST FORMAT**

1. Identification: "_____ THIS IS _____."
2. Warning order: "_____ (for example, TACAIR)."
3. Target location: "_____ (six-digit grid)."
4. Target description: "_____ _____ (what it is and what it is doing)."
5. Results desired: "_____ _____ (destroy, neutralize, or harass)."
6. Desired time on target : "_____."

c. The ALO at battalion and/or brigade then prepares and transmits an immediate CAS request in the format shown in Figure 6-2. (This format may also be used to request USAF AC-130 gunship support.)

LEGEND FOR CAS REQUEST FORMAT

ASOC	=	air support operations center	**SACC**	=	supporting arms coordination center
DASC	=	direct air support center	**TACC**	=	tactical air control center

Figure 6-2. **EXAMPLE IMMEDIATE CAS REQUEST FORMAT**

1. (TACP): "_____ (ASOC, DASC, TACC, or SACC) THIS IS _____ (TACP's ID) WITH AN IMMEDIATE CAS REQUEST."

   NOTE: Await acknowledgement.
2. "IMMEDIATE."
3. Target description: "_____."
4. Target location: "_____ (UTM grid coordinates), elevation _____ feet."
5. Time on target: "_____."
6. (Not transmitted).
7. Final control:

   "Call sign: _____."

   "Frequency: _____."

   "Contact point or initial point (IP): _____."
8. Remarks, such as—

   "Friendly location _____."

   "Weather _____."

   "Threats _____."

NOTE: The appropriate agency will approve or disapprove the request as well as request additional data required to execute the mission.

d. When the aircraft is within communications range, a fighter lineup or check-in briefing is transmitted. The format (aircraft transmits to controller) is shown in Figure 6-3.

Figure 6-3. EXAMPLE FIGHTER LINEUP OR CHECK-IN BRIEFINGFORMAT

Aircraft: "_____ THIS IS _____ ."
(controller call sign) (aircraft call sign)

1. Identification and mission number:
"_____ ."

   NOTE: Authentication and appropriate response suggested here.

2. Number and type of aircraft:
"_____ ."
3. Ordnance: "_____ ."
4. Time on station: "_____ ."
5. Abort code: "_____ ."

6-4. CLOSE AIR SUPPORT BRIEF

a. The ALO provides IP location and fighter run-in time from IP to target. The ALO also determines who will have final control of the CAS mission. If the ALO is not available, the FIST will direct the aircraft, but brigade prepares the CAS mission brief. Attack coordination requirements to include communications and laser designation information must be considered. The J-fire CAS brief (nine-line brief) is shown in Figure 6-4.

Figure 6-4. EXAMPLE J-FIRE CAS BRIEF (NINE-LINE BRIEF) FORMAT

1. Initial point: "_____ ."
(code, name, grid, latitude, and longitude)
2. Heading: "_____ " (magnetic) "OFFSET _____ ."
(IP to target) (left or right)
3. Distance: "_____ " in nautical miles.
(IP to target)
4. Target elevation: "_____ " (in feet above or below mean sea level [MSL]).
5. Target description: "_____ ."
(what it is and its relative position)
6. Target location: "_____ ."
(grids, latitude or longitude, and visual).
7. Type mark: "_____ ."
(WP, beacon, or laser)

   Code: "_____ ."
(beacon or laser)

   NOTE: For laser target marking, include laser-to-target line (in degrees).

8. Location of friendlies: "_____ ."
(relative to target, no grids)
9. Egress: "_____ ."
(cardinal direction and IP)

   Remarks: "_____ ."
(attack clearance, threats, restrictions, hazards, and abort codes)

   Time on target: "_____ ."
   or
   Time to target: "STANDBY _____ PLUS _____ HACK ."
(minutes) (seconds)

   "READY, READY, HACK."

b. The time to fire the CAS marking round is determined as shown in Figure 6-5.

> ***NOTE:*** The observer must control the marking round by using an AT MY COMMAND mission.

6-5. TROOP SAFETY

Troop safety is a key consideration in using CAS. Risk estimate distances for selected aircraft-delivered munitions are listed in Table 6-4.

6-6. AIR FORCE LASERS AND LASER-GUIDED WEAPONS

a. For Pave Penny and target identifier set, laser (TISL) missions, the pilot adjusts the system laser setting to the switch setting of the ground observer's laser designator. Upon receiving the three-digit switch setting of the ground designator from the TACP, the pilot converts it to the required four digits by inserting a 1 immediately before the three digits. Thus, the responsibility for the adjustment rests with the Air Force and requires only verbal confirmation (when possible) on the part of the laser designator operator.

b. Air Force laser-guided bombs have laser code settings that cannot be changed in the air. When the ground observer lases for the delivery of these munitions, he must change his switch setting to match that of the Air Force ordnance. To reduce the potential for enemy employment of countermeasures against these weapons, the laser guidance code setting should not be transmitted to the supported unit by the Air Force until the aircraft is on station. At that time, the pilot reports the setting to the TACP or FAC, who then relays it to the laser designator operator.

Figure 6-5. **EXAMPLE MARKING ROUND TIMING FORMAT**

INFORMATION NEEDED:

1. Time of flight (TOF) for marking round _____ and the rule of thumb (ROT) time _____ (usually 30 seconds). (Add 20 seconds for WP and 40 seconds for HC to TOF to allow for smoke buildup.)
2. Using the time on target method: TOT - (TOF + ROT) = time to fire.
   _____ - (_____ + _____) = _____
3. Using the time to target (TTT) method: TTT - (TOF + ROT) = time to fire (after hack).
   _____ - (_____ + _____) = _____
4. Using the time (IP to target) method:
   Time (IP to target) =distance (nautical miles [nm]) x seconds (sec)per nm.
   (See Table 6-3 for approximate aircraft speeds.)
   Time (IP to target) = distance (km) x sec per km. (See Table 6-3 for approximate aircraft speeds.)
   Time (IP to target) - (TOF + ROT) = time to fire (after aircraft departs IP).
   _____ - (_____ + _____) = _____

NOTE: The USMC laser Maverick missile is in-flight selectable, as are Hellfire missiles.

NOTE: The USMC and Navy Skipper II (AGM-123A) and the Navy 5-inch laser-guided projectile are not in-flight selectable.

The code will be four digits, and the first digit will be ignored. The last three digits will be set into the designator.

6-7. CLOSE AIR SUPPORT AIRCRAFT

Table 6-5 shows characteristics of various aircraft which can be used to provide close air support.

Table 6-3. **AIRCRAFT SPEEDS (APPROXIMATE)**

TYPE AIRCRAFT	NAUTICAL MILES PER HOUR	SECONDS PER NAUTICAL MILE	SECONDS PER NAUTICAL MILE
A-10	300 (330)	12 (10.9)	6.5 (5.9)
A-7	420 (480)	8.6 (7.5)	4.6 (4)
F-XX	480 (510)	7.5 (7.1)	4 (3.8)

NOTE: Numbers in parentheses are for wartime; others are for training. XX=any 'F' designated aircraft.

Table 6-4. **RISK ESTIMATE DISTANCE (METERS)**

ITEM	DESCRIPTION	10% PI	0.1% PI
AGM-65	Maverick missile	25	100
M-61, GAU-8, GPU-5	Guns	100	150
MK-20[1]	Rockeye	150	225
CBU-87, 89[1]	CEM, Gator	175	275
MK-82 HD	500-lb retarded bomb	100	375
MK-82 LD, GBU-12	500-lb slick or laser-guided bomb	250	425
CBU-52[1]	Bomblets	275	450
MK-84 LD, HD, GBU-10, GBU-24	2,000-lb slick, retarded, or laser-guided bomb	325	500
CBU-58, 71[1]	Bomblets	350	525

[1]Not recommended for troops in contact.

Table 6-5. **CLOSE AIR SUPPORT AIRCRAFT**

AIRCRAFT	SERVICE	CHARACTERISTICS
F-4	USMC Res, USAF NG, USAF Res	Multimission aircraft optimized for air-to-air combat; also has a good air-to-ground capability; supersonic; typical load 6,000 lbs, maximum load 16,000 lbs.
F-111	USAF	Tactical bomber; good all-weather and night capability; supersonic; typical load 12,000 lbs, maximum load 25,000 lbs.
A-4[1]	USN, USMC	Subsonic; typical load 4,000 lbs, maximum load 7,000 lbs.
A-6M	USMC	All-weather tactical bomber; subsonic; typical load 4,000 lbs, maximum load 9,000 lbs.
A-7[1]	USAF Res, USAF NG, USN	Very accurate delivery; subsonic; typical load 8,000 lbs, maximum load 15,000 lbs.
AV-8B1	USMC, USN	VSTOL CAS aircraft; subsonic; typical load 4,000 lbs, maximum load 9,200 lbs; 25-mm Gatling gun.
A-10 or O/A-10[1]	USAF, USAF Res, USAF NG	Specialized CAS aircraft; subsonic; typical load 6,000 lbs, maximum load 16,000 lbs; 30-mm gun.
O/A-37[1]	USAF NG	Subsonic; CAS version of primary trainer; typical load 2,000 lbs, maximum load 5,000 lbs; interdiction role in low threat environment.
F-15E	USAF	Multirole aircraft; priority to air-to-ground; also has an excellent platform for computed air-to-ground delivery; supersonic; maximum load 24,000 lbs.
F-16[1]	USAF,USAF Res, USAF NG	Multirole aircraft; complements the F-4 and F-15 in an air-to-air role; most accurate ground delivery system in the inventory; supersonic; typical load 6,000 lbs, maximum load 10,500 lbs.
F-18[1]	USN, USMC	Multirole fighter scheduled to replace the F-4; wide variety of air-to-surface weapons; typical load 7,000 lbs, maximum load 17,000 lbs; 20-mm gun mounted in the nose and air-to-air missiles.
AC-130[1]	USAF, USAF Res	Specialized CAS/RACO aircraft, propeller driven, two models. The A model is equipped with two 40-mm guns, two 20-mm guns, and two 7.62-mm miniguns. The H model is similar, except it has no 7.62 miniguns and one of the 40-mm guns is replaced with a 105-mm howitzer. Both models have advanced sensors and target acquisition system including forward-looking infrared and low-light TV. Weapons employment accuracy is outstanding. This aircraft is vulnerable to enemy air defense systems and must operate in a low ADA threat environment.

[1]Aircraft with FM communications.

NOTE: Typical load is average load for typical support mission; maximum load is the amount the aircraft can carry in an ideal situation.

6-8. NAVAL GUNFIRE

a. Ships Capable of Providing Naval Gunfire Support. The types of ships capable of providing naval gunfire support are frigates (FF), destroyers (DD), guided missile destroyers (DDG), guided missile cruisers (CG), nuclear-powered guided missile cruisers (CGN), and battleships (BB). Within each category of ship are a number of "classes." Ships of a certain class (built with the same plans) are referred to by using the name of the ship built in the class. *Knox Class Frigate* designates an entire group of similar vessels; the USS Knox was the first ship built of the class.

> ***NOTE:*** Technically, amphibious assault ships (LHAs) can fire two simultaneous missions. Because of the position of the gun mounts (forward, port, and starboard), the ship would have to maintain a bow-to-the-beach attitude to bring both guns to bear on the same coastline. This would severely curtail ship movement. Also, flight operations would cease during naval gunfire support (NGFS). The LHAs function as command ships and contain most of the landing force aviation assets and a good portion of the landing force. **Consequently, an LHA will provide NGFS only in an emergency.**

b. Ships Not Capable of Providing Naval Gunfire Support. Not all classes of ship with the designations previously mentioned can provide naval gunfire support. The following classes of ships are not capable and cannot be used in any plans for naval gunfire support roles:

- Bronstein class frigates (FF 1037-1038).
- Perry class guided missile frigates (FFG 7-60).
- Leahy class guided missile cruisers (CG 16-24).
- Bainbridge nuclear guided missile cruiser (CGN 25).

These ships either have no gun mounts or are equipped with a gun mount which is not suitable for NGFS.

c. Capabilities of Naval Gunfire.

(1) Mobility. While working within the limits of area hydrographic conditions, the ship can be positioned to provide the best support of ground forces. It can also be maneuvered to evade counterbattery or other enemy attack.

(2) Fire Control Equipment.

(a) The computerized fire control equipment permits accurate fire while the ship is under way.

(b) Some ships can fire more than one mission at a time. These ships have either the MK-86 gunfire control system (GFCS) or two separate GFCSs aboard.

(3) Variety of Weapons.

(a) From a planning standpoint, select the caliber (cal) of weapon that will accomplish the mission most effectively. A particular ship should be assigned a mission only within its capabilities.

(b) The exact range of each caliber weapon differs for the various projectiles (as shown in Table 6-6).

(4) Ammunition. A variety of ammunition can be delivered against targets with the available weapon systems.

(a) Fuzes available include:

- PD (or quick).
- Delay (for 5 inch 54 caliber only).
- Mechanical or electrical time.
- VT.
- Controlled variable time (CVT).

(b) The observer can select the charge, shell, and fuze combination which will optimize effects on each target.

Table 6-6. **RANGES OF NGF WEAPONS**

INCHES, CALIBER	AMMUNITION	FULL CHARGE RANGE (meters)	REDUCED CHARGE RANGE (meters)
5 inches, 38	HE, HC (MK49)	15,904	8,114
	Illuminating	14,173	6,858
	WP	16,070	7,750
5 inches, 54	HE, HC (MK64/41)	23,133	12,215
	Illuminating (MK91)	18,288	NA
	WP	20,004	16,733
16 inches, 50	HE (MK13)	36,188	22,951
	AP (MK8/9)	36,745	20,564
	ICM (MK144)	34,290	21,671

(5) High Initial Velocity.

(a) High initial velocity allows penetration and destruction of some types of fortified targets, particularly those presenting a vertical face to the gun-target (GT) line. For example, the 16-inch AP projectile, weighing 2,700 pounds, fired with a full service charge at a range of 2,000 yards, will perforate a concrete wall 36 feet thick. The same projectile at a range of 10,000 yards will penetrate 26 inches of class A armor.

(b) Initial velocities are shown in Table 6-7.

Table 6-7. **INITIAL VELOCITIES**

INCHES, CALIBER	INITIAL VELOCITY (Full Charge) (feet per second)
5 inches, 38	1,600
5 inches, 54	1,650
16 inches, 50 (HE and ICM)	1,615
16 inches, 50 (AP)	1,500

(6) Rates of Fire. High rates of fire allow a large volume of fire to be delivered in a relatively short period of time. Maximum and sustained rates of fire are shown in Table 6-8.

d. Call for Fire. The naval gunfire call for fire is a standardized format (as shown in Figure 6-6). The call for fire is normally sent in two transmissions.

(1) The first transmission contains:

- Observer or spotter ID.
- Warning order.
- Target number.

Table 6-8. **MAXIMUM AND SUSTAINED RATES OF FIRE**

INCHES, CALIBER	TYPE MOUNT	CLASS OF SHIP	MAXIMUM (RPMPG)	SUSTAINED (RPMPG)
5 inches, 38	MK-30	Long Beach	20	15
5 inches, 38	MK-28, MK-32	Iowa	20	15
5 inches, 54	MK-42	Knox, Adams Farragut Belknap, Truxtun	35	20
5 inches, 54	MK-45	Spruance, Kidd Arleigh Burke Ticonderoga California Virginia	20	20
16 inches, 50	MK-7	Iowa	2	1

NOTE: RPMPG represents rounds per minute per gun. The Iowa class BBs 16-inch 50-caliber guns have a sustained rate of fire of one round per minute; you should keep in mind that there are nine of these guns per ship. These nine guns firing one RPMPG could deliver 513 tons of high-explosive ordnance in 1 hour.

Figure 6-6. NAVAL GUNFIRE CALL FOR FIRE FORMAT

NAVAL GUNFIRE CALL FOR FIRE

(Spotter ID and warning order or target number)

(Target location) THIS IS _____, FIRE MISSION, TARGET NUMBER _____, OVER.

Grid _____ Direction _____ From target number _____

Altitude _____ Distance _____ Direction _____

Direction _____ Up or down _____ (from OP alt) Left or right _____

+ or – _____

(Target description) Up or down _____

(Method of engagement)

[] Danger close ____, ____ (direction, distance) first salvo at _____ (correction)

[] Reduced charge [] Shell AP [] Fuze delay

[] Shell WP [] Fuze time

[] Shell illumination [] Fuze CVT

(Shell HE fuze quick is standard.)

[] in adjustment [] in effect

[] Secondary armament [] ____ guns in adjustment [] ____ salvos in adjustment

[] ____ guns in effect

(Special instructions) [] Coordinated illumination [] Continuous illumination

[] Time on target _____ [] Interval _____ [] Sustained fires _____

(Method of control)

[] Fire for effect [] Cannot observe [] Ship adjust

[] At my command – used as a modifier (Spotter adjust is standard.)

NOTE: Elements having a standard value need not be stated.

Figure 6-6. NAVAL GUNFIRE CALL FOR FIRE FORMAT (Continued)

(Prefiring reports)

[] Gun-target line _____, or [] Line of fire _____

[] Summit _____ meters or feet, [] FIRST SALVO AT _____, READY, _____, OUT.

(Subsequent corrections)

SPOTTINGS			CORRECTIONS		
HOB	Range	Deviation	Deviation	Range	HOB

(_____ GUNS) _____ SALVOS, FIRE FOR EFFECT, OVER. [] ROUNDS COMPLETE, OUT.

[] Record as target, target number _____

END OF MISSION (BDA) _____ OVER.

(2) The second transmission contains:

- Target location and target description.
- Method of engagement.
- Method of control.

6-9. ARMY AVIATION ATTACK HELICOPTERS

Army aviation assets can be used to provide fire support as required. Capabilities of attack and scout helicopters are provided in Tables 6-9 through 6-11.

Table 6-9. **AH-1 WEAPONS CAPABILITIES**

SUBSYSTEM	MAXIMUM EFFECTIVE RANGE (meters)	MAXIMUM LOAD[1]	TARGETS
2.75-inch FFAR	9,300	76 (10-lb rockets) 62 (17-lb rockets)	Troops, trucks, or lightly armored vehicles; enemy air defense
7.62-mm minigun	1,100 (tracer burnout 900 meters)	4,000	Troops, trucks, or lightly armored vehicles
40-mm grenade	2,000	300	Troops, trucks, or lightly armored vehicles
20-mm cannon AP incendiary round	1,500	750	Trucks or lightly armored vehicles
TOW	3,750	8 missiles	Tanks and other hard targets

[1]The actual load depends on the mission, enemy situation, type attack helicopter, and atmospheric conditions.

Table 6-10. **AH-64 WEAPONS CAPABILITIES[1]**

SUBSYSTEM	MAXIMUM EFFECTIVE RANGE (meters)	MAXIMUM LOAD[2]	TARGETS
2.75-inch FFAR	9,300 indirect 5,400 direct	76 (10-lb rockets) 62 (17-lb rockets)	Troops, trucks, or lightly armored vehicles; enemy air defense
30-mm cannon dual-purpose (AP or HE)	2,500	1,200	Troops, trucks, or lightly armored vehicles
Hellfire	5,500 (+)[3]	16	Tanks and other hard targets

[1]The AH-64 is equipped with the pilot night vision sensor to enhance flight during periods of reduced visibility and with a target acquisition sight-designator to lase targets for laser-energy-seeking munitions.

[2]The actual load depends on the mission, enemy situation, and atmospheric conditions.

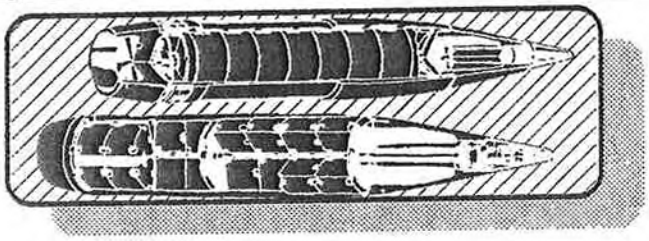
[3]The actual range is classified.

Table 6-11. **ARMED OH-58D WEAPONS CAPABILITIES**

SUBSYSTEM	MAXIMUM EFFECTIVE RANGE (meters)	MAXIMUM LOAD[1]	TARGETS
ATAS	4,000 (+)[2]	4 2 x 2 missile stores	Aircraft and helicopters
Hellfire	5,500 (+)[2]	4 2 x 2 missile stores	Tanks and other hard targets
70-mm rocket	9,300	14 2 x 7 shot pods	Troops, trucks, or lightly armored vehicles; enemy air defense
.50 cal MG	1,000	500 rounds	Trucks or lightly armored vehicles

[1]Weapon configurations for the OH-58D are extremely flexible. The .50 caliber machine gun can be mounted only on the left pylon. All other weapons can be mounted on both pylons. Only one weapon system (pod or store) can be mounted on each pylon. A standard configuration could include the .50 caliber MG on the left pylon and a seven-shot rocket pod on the right.

[2]The actual range is classified.



CHAPTER 7

SPECIAL MUNITIONS

7-1. FAMILY OF SCATTERABLE MINES

a. Description. There are two types of FA-delivered FASCAM: ADAM and remote antiarmor mine system (RAAMS).

(1) The M692 and the M731 projectiles are known as area denial artillery munitions, or ADAM. These are antipersonnel rounds that contain submunitions used to deny the enemy use of certain areas for a period of time. This is done by firing the ADAM round so that the 36 submunitions are ejected over the target area. After each submunition comes to rest on the ground, each of the seven sensor trip lines deploys up to 20 feet from the mine. After another short time delay, to allow the munition to return to rest, the trip line sensor is activated, causing the mine to be completely armed. Disturbing a trip line completes an electronic firing circuit. The thin layer of propellant which gravity places under the kill mechanism ignites. This shatters the plastic munition body and projects the spheroid kill mechanism upward. At a position 2 to 8 feet above the ground, the kill mechanism detonates, projecting approximately 600 1 1/2-grain steel fragments in all directions. If the mine has not detonated or functioned within the factory set time (long or short self-destruct [SD] time), the mine will automatically self-destruct.

(a) The M692 projectile has a long SD time. The M731 projectile has a short SD time.

(b) The ADAM range is 17,740 meters for M198 howitzers and 17,500 meters for M109A2/A3 howitzers.

(2) The M718 and M741 projectiles are of the remote antiarmor mine

system, or RAAMS. These projectiles are used to delay or disrupt enemy formations and maneuver or to reinforce existing obstacles. Each projectile contains nine mines that can be expelled into the target area. The mines are scattered over an area and become armed within a few seconds after landing. Any metallic object, such as a tank, self-propelled vehicle, or other type unit, passing over the mines will cause them to activate and damage or destroy the equipment. If after a certain period of time these mines have not been activated, they also provide a mechanism for self-destruction. Scattered among the mines are some that have an anti-disturbance firing mechanism that can cause casualties if disturbed by enemy personnel attempting to clear the mine area.

(a) The M718 projectile has a long SD time. The M741 projectile has a short SD time.

(b) The RAAMS range is 17,740 meters for M198 howitzers and 17,500 meters for M109A2/A3 howitzers.

(3) Most ADAM and RAAMS mines arm in 2 minutes. Product-improved FASCAM (type-designated A1) arm in 45 seconds. The dud rate for FASCAM is very low – approximately 52 per 1,000.

(4) The FASCAM mines begin to self-destruct at 80 percent of the SD time. The probability of a live mine existing past its stated SD time is 0.001. Upon arming, FASCAM mines perform a self-test. All mines that fail the self-test self-destruct immediately. Actual FASCAM SD times are as follows:

Short SD	SD Time
ADAM M731	4 hours
RAAMS M741, M741A1	4 hours
Long SD	
ADAM M692	48 hours
RAAMS M718, M718A1	48 hours

b. Technical Planning Data. The FSO must provide technical expertise to the engineer concerning the employment of FA-delivered FASCAM. Information with which the FSO should be familiar is as follows:

- Number, size, density, and type of minefields that supporting artillery can provide.
- Firing unit locations, trajectory, and number of aimpoints for each minefield.
- Size or location of the safety zone associated with each minefield as well as other troop safety considerations.
- Planning ranges for firing FA FASCAM.
- Information necessary for completing scatterable minefield reports (see FM 6-20-40).
- Self-destruct times for FA FASCAM.

c. Planning Factors.

(1) Although FASCAM minefields can be emplaced against targets of opportunity, FA FASCAM is normally most effective if employment is preplanned. Preplanned use allows the FSO to consider the unique capabilities and limitations of FA FASCAM, coordinate planning and employment requirements, and recommend optimum employment options. When employing FA FASCAM as an obstacle, the FSO should always consider the basic principles of minefield emplacement:

- Use FASCAM to augment or reinforce natural or existing obstacles IAW the commander's battle plans.
- Keep the minefield under observation and cover with direct or indirect fires.
- Plan to cover gaps and lanes in the minefield, to re-emplace the minefield, and to defeat breaching efforts.

(2) The FSO also should develop planning factors which show the number of minefields supporting artillery can provide to the maneuver commander. Planning modules which are standardized in the tactical standing operating procedure (TSOP) with respect to size, density, and number of munitions per aimpoint are a good technique. Typical preplanned minefield modules are shown in Table 7-1.

(3) For a target of opportunity minefield computed by battery computer system (BCS), a typical minefield module would be as follows:

- One aimpoint.
- Short duration.
- 24 RAAMS and 6 ADAM.

(4) The FSO also should be prepared to advise the commander and his staff on employment times for firing in FASCAM minefields and the risks associated with

Table 7-1. **FASCAM PLANNING**

LOW-ANGLE FIRE			
	NUMBER OF ROUNDS BY DENSITY		
SIZE	HIGH	MEDIUM	LOW
200 meters x 200 meters	24 RAAMS, 12 ADAM	12 RAAMS, 6 ADAM	6 RAAMS, 3 ADAM
HIGH-ANGLE FIRE			
	NUMBER OF ROUNDS BY DENSITY		
SIZE	HIGH	MEDIUM	LOW
400 meters x 400 meters	96 RAAMS, 12 ADAM	48 RAAMS, 12 ADAM	24 RAAMS, 3 ADAM

minefield emplacement. The unit shooting the minefield normally is unavailable for other fire missions. Also, the firing unit may have to displace upon completion of a minefield mission, which could result in a loss of fire support for a period of time.

(5) Minefield safety zones must be established on completion of all FASCAM missions. Depending on range and employment techniques, these safety zones may impose considerable risks on friendly operations.

> ***NOTE:*** For further information on FASCAM, see FM 6-20-40, Appendix H, or FM 6-20-50, Appendix I.

7-2. SMOKE

Smoke normally is employed by use of quick smoke and immediate smoke techniques. Information on smoke employment is shown in Tables 7-4 through 7-6. If the total amount of shell HC, WP, and RP to be fired for your unit is known, then use Tables 7-7 through 7-12 to determine the size of the area that can be screened and the duration.

a. The effects of atmospheric stability can determine whether smoke is effective at all or, if effective, how much ammunition is needed. (See Figure 7-1 for the temperature gradient effects on smoke.)

Figure 7-1. **TEMPERATURE GRADIENT EFFECTS ON SMOKE**

TIME OF DAY AND WEATHER CONDITIONS	SMOKE CONDITIONS (Temperature Gradient)	SMOKE BEHAVIOR (Wind Direction →)
Night—until 1 hour after sunrise. Wind speed is less than 9 kilometers per hour (kmph) (5 knots). Cloud cover is less than 30%.	*IDEAL* (stable or inversion)	
Day—most often between 1 and 2 hours before and after sunrise. Wind speed is 9 kmph (5 knots) or more. Cloud cover is 30% or more.	*FAVORABLE* (neutral)	
Day—beginning 2 hours after sunrise. Wind speed is less than 9 kmph (5 knots). Cloud cover is less than 30%.	*MARGINAL* (unstable or lapse)	

NOTE: Ideal, favorable, and marginal are smoke conditions. Stable, inversion, neutral, and lapse are temperature gradients.

(1) Under unstable conditions, HC and WP rounds are almost ineffective. The smoke does not spread but often climbs straight up and quickly dissipates.

(2) Under moderately unstable conditions, base-ejecting smoke rounds are more effective than bursting WP rounds.

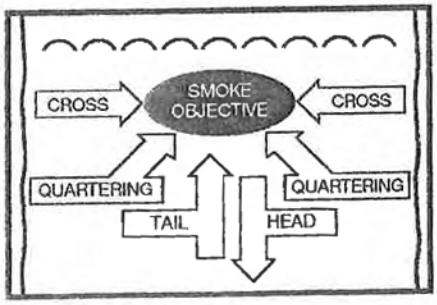
(3) The higher the humidity, the better the screening effects of both WP and HC rounds. (See Table 7-2.)

(4) The wind direction in relation to the smoke objective will affect smoke employment. (See Figure 7-2.)

Table 7-2. **HC AND WP SMOKE YIELDS IN VARIOUS HUMIDITIES**

RELATIVE HUMIDITY	HC	WP
%	*EFFECTIVENESS (percentage)*	*EFFECTIVENESS (percentage)*
0	100	100
10	146	353
20	152	372
30	159	391
40	173	411
50	189	434
60	211	465
70	240	510
80	325	588
90	572	785

Figure 7-2. **CLASSIFICATION OF WIND DIRECTIONS**



b. Weather and terrain conditions also impact on smoke effectiveness. (See Table 7-3.)

(1) If the ground in the target area is rain-soaked or snow-covered, burning smoke rounds may not be effective. During very cold and dry conditions or over snow, up to four times the number of smoke rounds may be needed to create an effective screen.

(2) Shallow water can reduce the smoke produced by base-ejecting rounds by as much as 50 percent. Bursting WP rounds are not affected as much by terrain in the target area; however, deep snow and cold temperatures can reduce the smoke cloud by about 25 percent.

(3) The higher the wind velocity, the more effective bursting WP rounds are and the less effective burning smoke rounds are.

Table 7-3. **CONDITIONS FOR SMOKE EMPLOYMENT**

FACTOR	MARGINAL	FAVORABLE	IDEAL
WIND	More than 10 knots	5 to 10 knots	Less than 5 knots
ATMOSPHERIC STABILITY CATEGORY	Unstable or lapse	Neutral	Stable or inversion
HUMIDITY	Low	Moderate	High
PRECIPITATION	None	Light rain	Mist or fog
CLOUD COVER	None	Scattered	Overcast, low ceiling
TERRAIN	Even	Gently rolling	Complex topography
VEGETATION	Sparse or none (desert)	Sparse to medium dense	Medium to heavily dense
TIME OF DAY	Late morning through late afternoon	1 to 2 hours before and after sunrise	1 hour before EENT to 1 hour before BMNT

LEGEND: **BMNT** = before morning nautical twilight **EENT** = ending evening nautical twilight

NOTE: For more information concerning smoke employment, see FM 6-20-40, Appendix H, or FM 6-20-50, Appendix I.

Table 7-4. SMOKE DELIVERY TECHNIQUES

DELIVERY TECHNIQUE	TYPE OF TARGET	NUMBER OF GUNS	TYPE OF AMMUNITION	SHEAF	OBSCURATION TIME	COMMAND AND CONTROL
Immediate smoke[1] (point and/or suppression)	Point or small area 150 meters or less	One platoon[2] (four guns)	First round WP or smoke Second round smoke	BCS	1/2 to 5 minutes	By SOP and/or approval of maneuver commander
Quick smoke (small area and/or suppression)	Small area 150 to 600 meters	One, two, or three platoons[2]	Smoke or WP	BCS	2 to 15 minutes	Approval of maneuver commander

[1]The immediate smoke technique can be used in an immediate suppression mission on a target of opportunity. By unit SOP, a mix of WP and smoke normally will follow the initial suppression rounds when immediate smoke is requested.

[2]Responsiveness dictates that both immediate and quick smoke missions be fired by platoon. For larger areas, consider multiple aiming points and use of the quick smoke technique.

Table 7-5. EQUIVALENT WIND SCALE FOR ESTIMATING WIND SPEED

KNOTS	OBSERVATION
1	Smoke, vapor from breath, or dust raised by vehicles or personnel rises vertically. No leaf movement.
1 to 3	Direction of wind slightly shown by smoke, vapor from breath, or dust raised by vehicles or personnel. Slight intermittent movement of leaves.
4 to 6	Wind slightly felt on face. Leaves rustle.
7 to 10	Leaves and small twigs in constant motion.
11 to 16	Wind raises dust from ground. Loose paper and small branches move.
17 to 21	Small trees with leaves sway. Coastal wavelets form on inland waters.
22 to 27	Large branches on trees in motion. Whistle heard in telephone or fence wires.
28 to 33	Whole trees in motion. Inconvenience felt walking against wind.

NOTE: A knot equals 1.15 miles per hour (mph).

Table 7-6. SMOKE EFFECTIVENESS

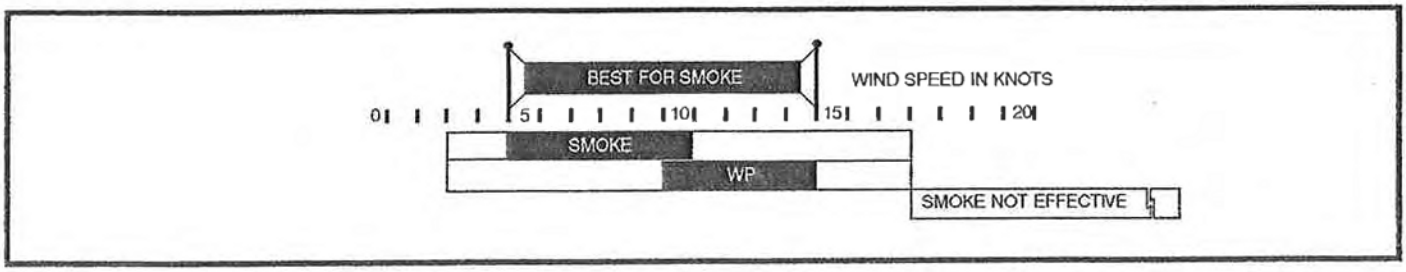


Table 7-7. QUICK SMOKE DATA – 155-MM SHELL SMOKE

			DURATION REQUESTED BY FORWARD OBSERVER (minutes)											
WEATHER CONDITION	WIND SPEED (knots)	RATE OF FIRE	4	5	6	7	8	9	10	11	12	13	14	15
			ROUNDS PER TUBE											
Ideal	5	1 round per 2 minutes	2	2	3	3	4	4	5	5	6	6	7	7
Favorable	5	1 round per 2 minutes	2	2	3	3	4	4	5	5	6	6	7	7
	10	1 round per 1 minute	2	3	4	5	6	7	8	9	10	11	12	13
	15	1 round per 40 seconds	3	4	6	7	9	10	12	13	15	16	18	19
Marginal	5	1 round per 40 seconds	3	4	6	7	9	10	12	13	15	16	18	19

Table 7-8. QUICK SMOKE DATA – 155-MM SHELL WP

			DURATION REQUESTED BY FORWARD OBSERVER (minutes)													
WEATHER CONDITION	WIND SPEED (knots)	RATE OF FIRE	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			ROUNDS PER TUBE													
Ideal	5	1 round per 2 minutes	2	3	3	4	4	5	5	6	6	7	7	8	8	9
Favorable	5	1 round per 1 minute	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	10	1 round per 30 seconds	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	15	1 round per 20 seconds	6	9	12	15	18	21	24	27	30	33	36	39	42	45
Marginal	5	Exceeds rate of fire														

Table 7-9. QUICK SMOKE DATA – 105-MM SHELL SMOKE

			DURATION REQUESTED BY FORWARD OBSERVER (minutes)												
WEATHER CONDITION	WIND SPEED (knots)	RATE OF FIRE	3	4	5	6	7	8	9	10	11	12	13	14	15
			ROUNDS PER TUBE												
Ideal	5	1 round per 1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14
Favorable	5	1 round per 1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14
	10	1 round per 30 seconds	3	5	7	9	11	13	15	17	19	21	23	25	27
	15	1 round per 24 seconds	4	6	9	11	14	16	19	21	24	26	29	31	34
Marginal	5	1 round per 20 seconds	4	7	10	13	16	19	22	25	28	31	34	37	40

Table 7-10. **QUICK SMOKE DATA – 105-MM SHELL WP**

			DURATION REQUESTED BY FORWARD OBSERVER (minutes)												
WEATHER CONDITION	WIND SPEED (knots)	RATE OF FIRE	3	4	5	6	7	8	9	10	11	12	13	14	15
			ROUNDS PER TUBE												
Ideal	5	1 round per 40 seconds	5	7	8	10	11	13	14	16	17	19	20	22	23
Favorable	5	1 round per 30 seconds	6	8	10	12	14	16	18	20	22	24	26	28	30
	10	1 round per 15 seconds	11	15	19	23	27	31	35	39	43	47	51	55	59
	15	1 round per 10 seconds	16	22	28	34	40	46	52	58	64	70	76	82	88
Marginal	5	Exceeds rate of fire													

Table 7-11. QUICK SMOKE DATA – MORTARS

WP MORTAR ROUNDS PER MINUTE TO MAINTAIN A SMOKE CURTAIN
(500-METER FRONT IN CROSS WINDS)

RELATIVE HUMIDITY (percent)	TEMPERATURE GRADIENT	WIND SPEED (knots) 2	4	9	13	18	22	26
	4.2-Inch Mortars							
30	Stable	13	13	11	11	13		
	Neutral	9	9	7	7	9	9	11
	Unstable	6	6	4				
60	Stable	9	9	7	9	9		
	Neutral	6	6	4	4	6	7	9
	Unstable	3	3	3				
90	Stable	7	7	6	6	7		
	Neutral	4	4	3	3	4	6	6
	Unstable	3	3	3				
	81-mm Mortars							
30	Stable	13	13	11	11	13		
	Neutral	9	9	7	7	9	9	11
	Unstable	6	6	4				
60	Stable	9	9	7	9	9		
	Neutral	6	6	4	4	6	7	9
	Unstable	3	3	3				
90	Stable	7	7	6	6	7		
	Neutral	4	4	3	3	4	6	6
	Unstable	3	3	3				

NOTES:
1. For quartering winds, multiply table values by 2.
2. For tail winds, multiply table values by 2.
3. For head winds, multiply table values by 2.5.
4. Table quantities are for shell impact on land; for water impacts, multiply table values by 1.4.
5. For curtains greater or less than 500 meters in width, scale the table values up or down proportionally.
6. To establish a smoke curtain, employ volley fire, using twice the table value (but not less than 10 rounds). You may round up to a number divisible by the number of guns firing the mission.

Table 7-12. **PLANNING DATA FOR SMOKE**

				AVERAGE OBSCURATION LENGTH (meters) PER ROUND		
				WIND DIRECTION		
DELIVERY SYSTEM	TYPE ROUND	TIME TO BUILD EFFECTIVE SMOKE (minutes)	AVERAGE BURNING TIME (minutes)	CROSS	QUARTERING	HEAD OR TAIL
155 mm	WP M110A1 HC M116A1	1/2 1 to 1 1/2	1 to 1 1/2 4	150 350	75 250	50 75
155 mm	WP M825	1/2	5 to 10	350	250	75
105 mm	WP M84 HC M60	1/2 1 to 1 1/2	1 to 1 1/2 3	75 250	60 175	50 50
107 mm	WP	1/2	1	200	80	40
81 mm (four mortars)	WP	1/2	1	100	60	40
81 mm (three mortars)	RP	1/2	2 1/2	100	60	40
60 mm (two mortars)	WP	1/2	1	75	50	40

NOTE: All rounds are fired as standard missions with parallel sheafs under favorable conditions.

7-3. ILLUMINATION

Illuminating rounds are used for signalling or for illuminating a designated area. Use of illuminating projectiles on the battlefield must be coordinated with other operations, especially at night. Illuminating rounds can temporarily degrade the functioning of low-light observation and vision devices This may result in unnecessary risk to aircraft and ground forces operating within the illuminated area. In addition to aerial signalling and illumination, ground burst illumination is also a technique for signalling or orienting a ground force for maneuver or attack. (See Table 7-13 for employment factors for illuminating shells.)

Table 7-13. **EMPLOYMENT FACTORS FOR ILLUMINATING SHELLS**

HOWITZER OR MORTAR	PROJECTILE	INITIAL HEIGHT OF BURST (meters)	DISTANCE BETWEEN BURSTS (SPREAD) (meters)	BURNING TIME (seconds)	RATE OF CONTINUOUS ILLUMINATION (rounds per minute)	RATE OF DESCENT (meters per second)
105 mm	M314A2	750	800	60	2	10
105 mm	M314A3	750	800	70 to 75	2	10
155 mm	M118	750	800	60	2	10
155 mm	M485A2	600	1000	120	1	5
155 mm	M335	700	500	60	2	10
107 mm	M335A1	700	500	70	2	10
107 mm	M335A2	400	1000	90	1	5
81 mm	M301A1	400	500	60	2	6
81 mm	M301A2	400	500	60	2	6
81 mm	M301A3	600	500	60	2	6

NOTE: The 60-mm illuminating round M83A3 has a maximum range of 950 meters and a minimum range of 725 meters. One round will provide moderate light over a square kilometer for about 25 seconds. The small size and limited burn time of the 60-mm illuminating round make it more suitable for point illumination than for area illumination. The 60-mm illuminating round normally can be used without degrading night vision devices of adjacent units. The 120-mm mortar illuminating round has not been fielded.

7-4. COPPERHEAD

a. Targets identified in the planning process may lie in an engagement area designated for the attack of armored vehicles. If so, the brigade FSO should consider the point target kill capability of Copperhead. Usually, the FSO issues only broad guidance on company-level Copperhead employment. He leaves actual target or aimpoint selection to subordinate FSOs. The brigade FSO and S3 also plan the use of any attached COLTs as designators for Copperhead. With the DS battalion S3, the brigade FSO coordinates target engagement criteria and positions for Copperhead firing units, since the effectiveness of Copperhead is determined to a great extent by the GT range and azimuth.

b. Optimum use of Copperhead is against multiple targets in large target arrays outside the range of maneuver direct fire weapon systems (about 3,000[+] meters). Single targets or very few, widely separated targets may be engaged by Copperhead if they are high-payoff targets, such as an enemy commander's vehicle. Targets appearing within the range of maneuver direct fire weapon systems should be engaged by Copperhead only when the direct fire systems are unable to engage them or when the maneuver commander directs.

c. Fire planning for Copperhead and COLT positions should consider the engagement ranges of the G/VLLD. Moving targets can be engaged at 3 kilometers and, depending on the skill of the operator, out to 4 kilometers (day sight only). Stationary targets can be engaged out to 5 kilometers. Positions should be planned so that engagement is within these ranges.

d. Copperhead targets can be engaged as either planned targets or targets of opportunity. Planned targets are the preferred method of engagement for Copperhead because the firing battery requires less reaction time. Normally, the target of opportunity technique is used only during mobile operations and before planned targets are developed. Copperhead planned targets normally are not fired as part of a schedule. They fall into two categories: priority targets and on-call targets.

(1) For priority Copperhead targets, data are precomputed and sent to the gun and the Copperhead round is laid on the loading tray. The Copperhead round should impact about 30 seconds plus time of flight after receipt of the call for fire when AT MY COMMAND is not specified. No more than three planned priority Copperhead targets are assigned a six-gun battery. In an eight-gun battery, each firing platoon can be assigned a maximum of two targets.

(2) On-call targets are processed the same as priority targets, except that the guns are not laid on firing data until after receipt of the mission. Normally, an on-call target can be processed in less than 2 minutes.

e. Proper planning and employment of the Copperhead munition require a thorough knowledge of Copperhead positioning and firing procedures by FSOs and FDCs. Steps involved in optimizing the employment of Copperhead are discussed below.

(1) Position COLT(s) and Select Firing Units. Given the commander's attack guidance and known firing unit locations, the FSO uses the Copperhead coverage template to select observer positions. The template allows the FSO to determine effective Copperhead engagement areas from a given position. Once these areas are constructed, the FSO can determine if the engagement area supports the commander's intent. If it does not support the commander's intent, another observer location must be selected. If another observer location is not available, the firing unit location may be moved. Positioning of firing units to support Copperhead engagement must be coordinated through the brigade FSO to the FA battalion S3. FM 6-20-40 and FM 6-20-50 discuss use of the Copperhead coverage template in greater detail and give a pattern for the Copperhead templates.

(2) Plan Target Engagement. The COLTs and other observers with laser designators must be thoroughly familiar with Copperhead target engagement procedures. Key to engagement planning is the selection and use of the proper Copperhead footprint template. The optimum limit of engagement of a target by a Copperhead round falls within a footprint. Selection of the footprint is based on the GT range and cloud height. The observer must select the correct footprint template, orient and draw the footprint on his map, and then visualize this footprint on the ground within the engagement area. The firing unit FDC must know the footprint letter code of the template the observer is using. The observer must also determine and visualize target intercept points for engagement of moving targets within the footprint. This requires estimation of both speed of the target and distance the target will travel during mission processing and time of flight. FM 6-30 describes in greater detail the observer tasks associated with Copperhead employment.

(3) Plan Copperhead Fire Mission. Observer and FDC procedures for firing Copperhead missions differ depending on whether the target is preplanned or a target of opportunity. Procedures also vary depending on whether the fire mission will be planned, computed, or executed using digital and automated equipment. Whether digital or voice communication is used and whether BCS, backup computer system (BUCS), or manual computation is used will influence Copperhead mission planning and execution. Detailed unit SOPs dealing with Copperhead missions are helpful in rapidly determining and disseminating mission-essential information needed for accurate and responsive fires. TC 6-40 and TC 6-40A discuss Copperhead fire mission planning and execution in greater detail.

f. Table 7-14 gives closure rates in minutes for determining target intercept points.

7-5. LASER SAFETY

The FSCOORDs and FSOs must ensure that adequate safety precautions are considered and safety procedures are adhered to during laser operations. The number of laser-equipped soldiers, target acquisition systems, and combat vehicles and aircraft is increasing. Laser use during training, especially during force-on-force training or when laser-guided weapons are used, requires strict safety controls to protect both laser operators and personnel downrange from laser sources. FM 6-30 and AR 385-63 contain additional information on laser safety and laser hazards.

Table 7-14. **CLOSURE RATES**

DISTANCE TRAVELED (meters)	VEHICLE SPEED (kilometers per hour)					
	5	10	15	20	25	30
	TIME (minutes)					
3,000	36	18	12	9	7.2	6
2,500	30	15	10	7.5	6	5
2,000	24	12	8	6	4.8	4
1,500	18	9	6	4.5	3.6	3
1,000	12	6	4	3	2.4	2

7-6. ICM EMPLOYMENT

a. Table 7-15 provides information on the number and type of submunitions (bomblets) associated with FASCAM and improved conventional munitions.

b. All ICM produce duds–bomblets or submunitions that have failed to arm or detonate. Cluster bombs, combined effects munitions, and FASCAM delivered by Air Force, Navy, or Marine corps aircraft also produce dud submunitions. The dud rate for the various ICM varies but is normally less than 5 percent. This rate can be higher if correct employment procedures are not followed or if ICM are delivered into a target area where the terrain is not suited for ICM employment.

Table 7-15. **IMPROVED CONVENTIONAL MUNITIONS**

CALIBER	MODEL	TYPE	PAYLOAD
105 mm	M444	APICM	18 M39 grenades
155 mm	M449A1	APICM	60 M43 grenades
155 mm	M483A1	DPICM	88 M42/M46 grenades
155 mm	M864	ER DPICM	72 M42 grenades
155 mm	M692A1	ADAM-L	36 AP mines
155 mm	M731A1	ADAM-S	36 AP mines
155 mm	M718A1	RAAMS-L	9 AT mines
155 mm	M741A1	RAAMS-S	9 AT mines
203 mm	M404	APICM	104 M43 grenades
203 mm	M509A1	DPICM	180 M42 grenades
MLRS	M270	DPICM	644 M77 grenades
Lance	M251	ICM	825 BLU-63/B bomblets
Lance	M251A1	APAM	580 M74 grenades
ATACMS	BLOCK I	APAM	950 M74 grenades

LEGEND:
APAM = antipersonnel and antimateriel
ATACMS = Army tactical missile system
BLU = bomblet unit
ER DPICM = enhanced range DPICM
L = long delay
S = short delay

c. Dud bomblets and submunitions can impose significant risks to friendly personnel and equipment. The FSCOORDs and FSOs must advise commanders and their staffs on the risks associated with ICM employment. This risk assessment must be compared to the effectiveness of using ICM in meeting the commander's intent for fire support of an operation.

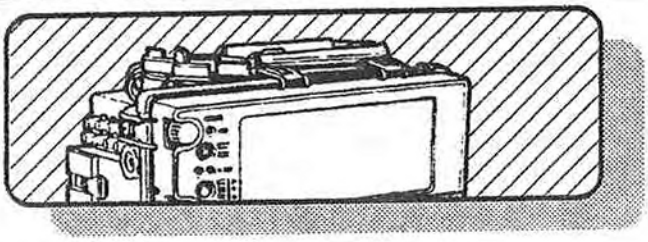
d. Planning for ICM attack of targets should incorporate the following employment and safety considerations.

(1) Employment considerations are as follows:

- Do not fire ICM if some other munition is available and can provide desired effects on target.
- Use joint munitions effectiveness manuals (JMEMs) or automated technical fire direction (TACFIRE, BCS, fire direction system [FDS], lightweight tactical fire direction system [LTACFIRE]) solutions to determine volume of ICM fires.
- Restrict ICM employment in forests, mountainous areas (slope greater than 60 percent), rocky uneven terrain, or soft marshy areas or into target areas covered with deep snow or water.
- Do not fire into areas where dismounted operations are planned (breaching or fording sites) or where light forces will operate (an air assault landing zone [LZ] or light infantry objective).

(2) Safety considerations are as follows:

- Ensure personnel are trained to identify the various submunitions and bomblets of ICM and are aware of their hazards.
- Establish and follow procedures for disseminating information concerning areas where dud ICM submunitions pose a hazard to friendly operations. This is especially critical for combat support (CS) and combat service support (CSS) units supporting a current operation as well as for follow-on or reinforcing units.



CHAPTER 8

FIRE SUPPORT IN A DIGITAL ENVIRONMENT

8-1. FIRE PLANNING

Upon receipt of the task force order, the TF FSO develops a fire plan to support the task force operation. The target list and known point list are sent to the battalion FDC, and a copy of the target list and known point list are provided to each FIST and special FO at the time the team commanders are briefed by the TF commander. The FIST places the target list and known point list on his map overlay. A copy is made for each platoon leader and the team commander. A minimum number of additional targets may be required by the FIST to support the team operation. Any additional requested targets are relayed by use of the DMD relay function to the TF FSO. They are sent via the fire plan format with the FIST target number in the plan name. After reconciliation, the TF FSO adds any necessary targets to the target list via FM;RFAF message with EOM:X, RAT:T and notifies all FISTs of the new approved targets via plaintext message (PTM). The intent of this system is to reduce target duplication, speed up fire planning, and allow FISTs to add required targets.

8-2. FIRE PLAN NAMES

Fire plan names are standardized throughout a corps. The fire plan name identifies the type of fire plan and who established it. Name fire plans IAW TC 6-40A, Appendix B (Figure 8-1).

Figure 8-1. **FIRE PLAN NAME AND PLAN DESIGNATOR LIST**

PLAN: _ _ØØxx;

_ _ - type of plan (see Plan Designator List)

ØØ = first Ø — numerical designator from the target block of the establishing agency

second Ø — numerical designator for type of fire plan

xx = alfa designators from the target number block of the establishing agency

PLAN DESIGNATOR LIST

PP	=	preparation
CP	=	counterpreparation
SA	=	suppression of enemy air defense
QK	=	quick fire plan (hasty)
CM	=	countermortar
CB	=	counterbattery
CF	=	counterfire
GP	=	group
SR	=	series
MN	=	FASCAM minefield

NOTE: Other two-letter designators can be established as needed.

EXAMPLES

PLAN: **CMØ1AB**; = first countermortar program planned by Fire Support Element, 2d Bde, 1st Div

PLAN: **CPØ2AY**; = second counterpreparation planned by Div Arty TOC, 1st Div

PLAN: **QK31AC**; = first quick (or hasty) fire plan planned by 2d Bn FSO, 3d Bde, 1st Div

8-3. FIRE PLANNING SEQUENCE

The recommended fire planning sequence in Table 8-1 is developed to help the TF FSO and the FA battalion operations and intelligence (O&I) section to execute their fire planning responsibilities effectively. The brigade FSO is the originator of the fire plan in the fire planning sequence.

The steps will work equally well for a TF FSO or the O&I section. The brigade FSO will provide the appropriate fire planning guidance to the TF FSOs to coordinate targets that will be included in the fire plan.

Following the sequence of action by each section, with the necessary coordination effected, will result in the development of the desired fire plan. The brigade FSO coordinates with TF FSOs for targets to be included in the fire plan. The TF FSO coordinates with FISTs to transmit targets via DMD relay function through the battalion computer. Targets can also be sent directly from co FIST DMD to TF FIST DMD.

Table 8-1. **SEQUENCE OF FIRE PLANNING**

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 1			
a. Establish NNFP MOD file.	NNFP;COMD NNFP;MOD NNFP;XCLUDE NNFP;ATTACK NNFP;FUSEL		If step 1 is omitted, the system will use the criteria established for tactical fire control (TFC). The FSO input is based on commander's criteria. Only changes need to be input. With appropriate guidance, the O&I section may input or modify the MOD file.
b. Establish related files	AFU;BUILD SPRT;BUILD		Fire units and geometry data to be used must be included. FSO input is based on fire units and geometry to be used in the fire plan. Refer to paragraph 8-4 for mortar criteria.
c. Reserve fire units.	NNFP;RESFU		This action may be completed anytime before step 3. The FSO input is optional. Input by O&I is based on other priorities.
d. Review NNFP MOD file.	NNFP;COMD AFU;COMD SPRT;COMD	NNFP;4221 AFU;2203 SPRT;7202	This action cannot be done at VFMED. The MOD file can be printed only at FDC. The FSO requests O&I to review files to ensure correct data are reflected.

Table 8-1. SEQUENCE OF FIRE PLANNING (Continued)

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 2			
a. Develop preliminary target list (FPLST).	ATI;PREFP NNFP;FPTU	ATI;8209 NNFP;4211	The FSO will follow procedure(s) 1 and/or 2 below.
Procedure 1: Previously established standing requests for information (SRIs) should provide majority of targets for fire plan. (SRIs **do not** automatically put targets in a fire plan.) For additional targets, use circular, rectangular, or thrust search. If zone search is necessary, transmit SPRT;BUILD to div arty or FA brigade before inputting the ATI;PREFP format. With ATI;PREFP, use COUNT until the desired number of targets are located; then use ATI;PREFP with the battalion computer in the TO field, COUNT left blank, and **the same criteria as in the last ATI;PREFP count.**			
Procedure 2: Use NNFP;FPTU format to input target provided by battalion FSOs or FISTs and targets received as a result of SRIs directly into the FPLST. This may be a faster method to input targets into the FPLST if SRI provides only a few targets or if time is a critical factor.			
b. Review and/or verify preliminary target.	NNFP;COMD	NNFP;XTGT	The FPLST must be reviewed for completeness.
c. Update preliminary target list.	ATI;PREFP NNFP;FPTU		Use ATI;PREFP for major changes. Use NNFP;FPTU for minor changes.
NOTE: Repeat step 2b as necessary until all targets are in FPLST.			
d. Develop fire plan target (FPTGT) and ONCALL target list.	NNFP;INST		This action should be performed on all targets that are to become fire plan or on-call targets. These entries override NNFP MOD file entries **except** ECOF and MAXVOL.
e. Review and/or verify FPTGT and/or ONCALL list.	NNFP;COMD	NNFP;XTGT	FPTGT and ONCALL list must be reviewed for completeness.
NOTE 1: All targets input into the FPTGT or ONCALL target list must have been cleared by the FSO.			
NOTE 2: At this stage, the fire plan is ready to be computed. Close coordination between the FSO, O&I, and FDC are required before proceeding. The O&I will normally provide the necessary information to the FSO for coordination with the maneuver commander. The time available before firing the plan and current activities within the FA battalion (displacement and so forth) dictate the appropriate time to complete the following steps. Either the FSO or O&I may compute the fire plan (NNFP;COMFP) upon completion of all necessary coordination. Steps 4 through 6 should be completed by the O&I only.			

Table 8-1. **SEQUENCE OF FIRE PLANNING (Continued)**

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 3			
a. Compute fire plan solution.	NNFP;COMFP	NNFP;4214 NNFP;4217 NNFP;4218 NNFP;4219	After this step, if NNFP;INST or NNFP;FPTU is used, the fire plan must be recomputed.
b. Review fire plan solution for problems and final coordination.	NNFP;COMD	NNFP;XTGTs NNFP;XSCDs	The FSO must manually develop a time schedule matrix from these output messages. O&I can retrieve it from FDC.
c. Modify computed fire plan.	NNFP;FPA NNFP;INST NNFP;COMFP		Modifications are performed by O&I to change scheduling and/or correct exceptions based on FSO guidance. If NNFP;INST is used, fire plan must be recomputed. **Do not** recompute if NNFP;FPA is used.
NOTE: Repeat steps 3b and c as necessary.			
STEP 4			
a. Execute fire plan.	NNFP;EXECFP	NNFP;4223	**Do not enter XMIT.**
b. Review fire command summary.			Compare with targets in schedule of fires (TISF) report. (This should be done by FDO or O&I.)
STEP 5			
a. Transmit H-hour to MLRS FDS as necessary.		SYS;PTM	
b. Transmit fire commands to batteries or MLRS.	NNFP;EXECFP	NNFP;FC NNFP;TARGET	Enter XMIT;X.

Table 8-1. SEQUENCE OF FIRE PLANNING (Continued)

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 6			
a. Update files.	AFU;BAMOUP AFU;OPSTAT		This action is used to account for ammunition expenditures.
b. Delete files (bn and div arty).	NNFP;COMD		This action is used to purge plan from SPRT, AFU, and NNFP files.
NOTE: When current ammunition levels are to be considered or fire units have recently moved, ammunition fire unit (AFU) data must be updated immediately. The fire plan must be recomputed, modified as necessary, and executed again with the new fire unit data.			

8-4. MORTARS IN FIRE PLANNING

a. For field artillery support operations, mortar fires should be considered only for fire planning purposes. It is critical that PLAN NAME be used in this process; otherwise, mortars would interfere with normal fire mission operations.

b. The TACFIRE does not contain weapon description data for mortars. The M102 105-mm howitzer can be selected to allow FSOs to incorporate mortars into a fire plan if desired. Ballistics data are irrelevant, as all the FSO wants is a scheduled time and phase in which to fire those targets designated as mortar targets. The mortar platoon FDC computes all ballistic data. The TF FSO must provide the target information and the schedule of fires to the mortar platoon FDC.

c. The entries in the AFU;UPDATE are necessary to include mortars in a fire plan. Name mortar units as shown in Figure 8-2. (Refer to TC 6-40A, Appendix B.)

Figure 8-2. MORTAR FIRE PLAN NAME

FU:R/F/a/#_/xx_:

R	=	Mortar
F	=	Mortar type:
2	=	120 mm
4	=	4.2 inch (107 mm)
6	=	60 mm
8	=	81 mm
a	=	Unit alfa designator
#	=	Battalion numerical designator
xx	=	Regimental numerical designator

EXAMPLE
FU:R/8/A/2_/21_; = 81-mm mortars from Co A, 2d Bn, 21st Regt.

(1) Enter mortars into PLAN;MORxxx (xxx = FSO's regimental designation) as shown in Figure 8-3.

Figure 8-3. ENTERING MORTARS IN A FIRE PLAN

PLAN:	MORxxx
FU:	As established in subparagraph c
READY:	X
WPN:	105 mm
MODEL:	M102
MSN:	DS
APL:	H/C
ST:	2 (defaults = 2; 6,400-mil site)
WSTR:	Number of mortars in FU
AZ:	Azimuth of fire
DF:	3200 if ST: 2 2800 if ST: 1
CORD:	Easting/northing/altitude
ZONE:	Maneuver battalion zone of operation
TRAVLR:	850/850 (track mounted) 6399/6399 (ground mounted)
RT:	0
MAXEL:	1156
MAXRTE:	18.0
SUSRTE:	3.0
MAXRNG:	(Tens of meters) 1 = shell type HEA 3 = shell type CHA 1/565, 3/565 (M329A1, 4.2 inch) 1/684, 3/684 (M329A2, 4.2 inch) 1/459, 3/459 (M347A2, 81 mm) 1/485, 3/485 (M347A3, 81 mm)
MINRNG:	(Tens of meters) 92 (M329A1, 4.2 inch) 77 (M329A2, 4.2 inch) 7 (81 mm—both models)

(2) Ammunition files also must be established for the mortar sections for fire planning purposes, or the mortar units will not be scheduled. The AFU;BAMOUP is used to establish these files as shown in Figure 8-4.

d. Build from PLAN:MORxxx; into NEWPLN.

e. Order mortar unit 1 in NNFP;FUSEL. This ensures that it will be chosen for all targets within range. If mortars are selected for too many targets, reassign excess targets to artillery units.

f. After TISF is computed, provide mortar platoon with data from TISF (NNFP;XTGT and NNFP;XSCD) for mortar targets. Mortar units will compute their own firing data.

g. After establishing ammunition and fire unit files for each mortar platoon for the fire plan, the commander's criteria established in Table 8-1, step 1a may be used.

Figure 8-4. **ENTERING AMMUNITION FILES**

PLAN:	MORxxx (xxx = bn FSO's regimental designation)
FU:	As established in AFU;UPDATE
AMOR:	X indicates resupply after initial ammunition count (Note 1).
AMOE:	X indicates ammunition expended (Note 2).
AMOH:	X indicates initial ammunition count (Note 3).
PROJA:	HEA/X/33.0/AAAA, SMA/Y/33.0/AAA, ILA/Z/33.0/AAAA (Note 4).
PROJB:	GSB/A/33.0/AAAA,GSD/B/33.0/AAAA
PLOT:	Powder lot and characteristics (Note 5)
FZE:	PDA/CCCC, TIA/DDDD, TIB/EEEE (Note 4)

NOTES:

1. Enter AMOR:X; field **only** for subsequent ammunition resupply.
2. Enter AMOE:X; field for ammunition or fuzes expended.
3. Always enter AMOH:X; field for initial ammunition inventory.
4. PROJA and PROJB:

SHELL			FUZE		
HEA	=	HE	**PDA**	=	PD and chemical time
SMA	=	WP			
ILA	=	illum	**TIB**	=	Time illum
GSB	=	GB (gas)	**TIA**	=	Time except chemical and illumination
GSD	=	HD (gas)			

5. Enter shell and fuze only. Semifixed ammunition (ammo) has no separate PLOT.

Figure 8-5. **BUILDING A MOD FILE**

Format:	NNFP;COMD
PLAN:	Enter plan name with the MOD file to be copied.
NEWPLAN:	Enter your plan name IAW TC 6-40A, Appendix B (paragraph 8-2).
BUILD:	X
MODF:	X

Figure 8-6. **BUILDING AN AFU FILE**

Format:	AFU;BUILD
PLAN:	Leave blank.
NEWPLAN:	Enter your plan name.
FU:	Enter fire unit name as needed for specific information (not entered with WPN).
WPN:	Enter weapon system as needed for specific information (not entered with FU).

Figure 8-7. **BUILDING A SPRT FILE**

Format:	SPRT;BUILD
PLAN:	Leave blank.
NEWPLAN:	Enter your plan name.

8-5. BUILDING A FIRE PLAN WITH TACFIRE

a. Build a MOD file as shown in Figure 8-5.

b. Build an AFU file as shown in Figure 8-6.

c. Build a SPRT file as shown in Figure 8-7.

d. Enter targets into the FPLST as shown in Figure 8-8.

e. Review the FPLST for completeness as shown in Figure 8-9.

f. Place targets **from** the FPLST **into** the FPTGT as shown in Figure 8-10.

g. Review the FPTGT for completeness and accuracy as shown in Figure 8-11.

Figure 8-8. **ENTERING AND ADDING TARGETS TO FPLST**

Div arty computer available for ATI retrieval:

Format: ATI;PREFP
SB: Enter subscriber name of div arty.
PLAN: Enter your plan name.
TO: Enter your subscriber name for all COUNTs.
TO: Enter battalion computer name to have targets sent from div arty to your plan.
COUNT: Enter X (unless TO equals battalion computer).
LOC: If rectangular or thrust search
React: Easting/northing/easting/northing
Thrust: East/north/east/north/width
CIR: If circular search east/north/radius
ZONE: If zone search (must first be built at div arty for plan name with SPRT;BUILD)

NOTE: All other entries are used for specific search criteria. Enter battalion name in TO field only after last count is a satisfactory number of targets to be put into the plan.

To add additional targets to the FPLST:

Format: NNFP;FPTU
PLAN: Enter your plan name.
CORD: Enter the grid coordinates of the target.
TGTS: Enter target number for this target.
TYPE: Enter target type and subtype.
DOP: Enter degree of protection if personnel-type target.
SIZE: Enter target size: radius, length, or width.
ATT: Enter target attitude if irregularly shaped target.
STR: Enter target strength.
RAT: X if to be stored in battalion target file in addition to NNFP files.

Figure 8-9. REVIEWING FPLST

Format: NNFP;COMD
PLAN: Enter your plan name.
XMIT: X
TO: Enter your subscriber name
FPLST: X

Figure 8-10. PLACING TARGETS INTO FPTGT

Format: NNFP;INST
PLAN: Enter your plan name.
FPTGT: X
TGTS: Enter the target numbers that are to have the same instructions (such as phase).
PRIOR: Leave blank (defaults to 4).
PHASE: Enter the phase (1, 2, 3, or 4) that the target will be engaged (do not use with H).
H: Specify + or - in relation to H-hour that you want the target to be engaged; for example, +5 means the target will be engaged at H + 5 minutes, or 5 minutes after H-hour.
GROUP: Do not use.
SERIES: Do not use.
UFFES: Use only if you have specific guidance.
EFF: Use only if you have specific guidance.
VOL: Use only if you have specific guidance.
SH: Use only if you have specific guidance.
FZ: Use only if you have specific guidance.
ANGLE: Do not use.

Figure 8-11. REVIEWING FPTGT

Format: NNFP;COMD
PLAN: Enter your plan name.
XMIT: X
TO: Enter your subscriber name.
FPTGT: X

Figure 8-12. **PLACING TARGETS INTO TISF**

Format:	NNFP;COMFP
PLAN:	Enter your plan name.
HHOUR:	Enter the maneuver H-hour if known.
ONCALL:	Do not use.
PRIOR:	Do not use.
FPLST:	**Do not use for regular fire plan.**
PHASE1:	____/__; **PHASE2:** ____/__;
PHASE3:	____/__; **PHASE4:** ____/__;

NOTE: The first subfield of the phase is the time in relation to maneuver H-hour that the phase is to start. The second subfield is the duration in minutes of that phase.

EXAMPLE

PHASE1: Ø___/5_; PHASE2: 5__/10; PHASE3: 15__/5_;

Phase 1 will start at Ø(H-hour) and last for 5 minutes.

Phase 2 will start at H + 5 and last for 10 minutes.

Phase 3 will start at H + 15 and last for 5 minutes.

NOTE: The duration of each phase depends on the number of targets in each phase, the type of targets and how they will be engaged based on the MOD file, and the number of available fire units. Numerous variables prevent establishing a standard rule for determining phase lengths quickly. However, a good starting point would be 1 minute for each target with the 155-mm fire units, 1 to 1.25 minutes for each target with 155-mm and 203-mm fire units, and 1:25 to 1.5 minutes for each target with only 203-mm fire units. Times may have to be adjusted lower or higher once the fire plan has been reviewed.

Figure 8-13. **SENDING FOR TISF**

Format:	NNFP;COMD
PLAN:	Enter your plan name.
XMIT:	X
TO:	Enter your subscriber name.
TISF:	X

NOTE: The fire plan summary (FPSUM) can no longer be transmitted.

h. Place targets **from** the FPTGT **into** the TISF as shown in Figure 8-12.

i. Send for the TISF as shown in Figure 8-13.

j. Watch for the EXC field at the end of the NNFP;XTGTs to determine if exceptions exist. An entry of 1 indicates a scheduling exception, which means you did not allow enough time for that phase of the fire plan. An entry of 2 indicates a capability exception, which means that the available fire units could not defeat the target based on the

guidance established in the MOD file or the target is out of range for all units. An entry of 3 indicates an ammunition exception, which means there is not enough ammunition on hand for selected fire units to engage the target with the selected shell-fuze combination.

k. Procedures for resolving exceptions are discussed below.

(1) Scheduling Exceptions. If additional time is available for the fire plan, recompute and allow more time in the duration subfield of the phase. If additional time is not available, analyze the target (or ask O&I to analyze) and reduce the number of volleys to be fired to what can be fired in the available time.

(2) Capabilities Exceptions. Analyze the target (or ask O&I to analyze). Reduce the percentage of effects or number of volleys to what the computer indicates it can achieve on the NNFP;XSCD. The last alternative is to delete the target. Be prepared to make that decision based on your maneuver commander's guidance.

(3) Ammunition Exceptions. Select a different shell-fuze combination to engage the target.

l. Make changes to the target engagement criteria with the NNFP;INST format, and recompute the fire plan with the NNFP;COMFP. After all computations, review the entire TISF to ensure that no new exceptions were created.

m. At this point, O&I should execute the fire plan and compare the fire commands with the TISF before sending data to the fire units. If the comparison is good, O&I will then transmit fire commands to the fire units.

n. Once the fire plan has been fired and the data on file are no longer needed, perform file maintenance on the fire plan as shown in Figure 8-14.

o. If zone is built at div arty to support an ATI;PREFP zone search, file maintenance must be performed at div arty as shown in Figure 8-15.

Figure 8-14. **PERFORMING FILE MAINTENANCE**

Format:	NNFP;COMD
PLAN:	Enter your plan name.
PURGE:	X

Figure 8-15. **PERFORMING FILE MAINTENANCE AT DIV ARTY**

Format:	NNFP;COMD
SB:	Enter div arty subscriber name.
Plan:	Enter your plan name.
PURGE:	X

NOTE: After PURGE:X, type an EOT character. A full battalion NNFP;COMD will not process at div arty.

8-6. PLANNING SERIES AND GROUPS

a. The TACFIRE can hold only 32 plan names. Two of these are for computer use: plan current and plan master. There are only 30 plan names (plans) available for use. Groups, series, preps, counterpreps, and FASCAM fire plans count against the total of 30. The brigade FSO will allocate a number of plan names to each task force FSO for use.

b. You may have more plans for an operation than plan names. In this case—

- Contact brigade FSO to release any plans held at brigade.
- Input the most critical plans first, purging obsolete plans and inputting new ones as the situation develops.
- Consider reducing the number of plans.

> ***NOTE:*** This limitation of plan names is a problem only when a div arty computer is not available. A div arty computer computes groups and series properly. That is, groups and series are part of a plan, not separate plans themselves. There is a limit of 15 groups and 15 series within a plan at div arty.

8-7. BUILDING A SERIES WITH BATTALION TACFIRE

The following are procedures for building a series with battalion TACFIRE:

- Name a series in accordance with paragraph 8-2.
- Build files as shown in paragraphs 8-5a, b, and c but with only one fire unit, if possible.
- Enter targets into the FPLST as shown in paragraph 8-5d.
- Follow instructions in paragraphs 8-5f through n with the following guidelines:
  - Do not use series field on NNFP;INST—this field is used only at div arty.
  - Place targets in FPTGT status on the NNFP;INST, specifying one target number at a time with priority (1-4) and phase (1-4) specified. Volleys may be specified to help prevent exceptions to scheduling. Continue for all phases if needed. This will provide a maximum of 16 targets within a series.
  - Compute with the NNFP;COMFP format as if this were a regular fire plan. Any exceptions must be resolved.
  - Execute as a normal fire plan (NNFP;EXECFP).

8-8. BUILDING A GROUP WITH BATTALION TACFIRE

The following are procedures for building a group with battalion TACFIRE:

- Name a group in accordance with paragraph 8-2.
- Build files as shown in paragraphs 8-5a, b, and c.
- Enter targets into the FPLST as shown in paragraph 8-5d.
- Follow instructions in paragraphs 8-5f through n with the following guidelines:
  - Do not use group field on NNFP;INST – this field is used only at div arty.
  - Place targets in ONCALL status on the NNFP;INST, specifying one target number and one fire unit at a time.
  - Compute with NNFP;COMFP format, ONCALL:X. Any exceptions must be resolved. On-call targets with exceptions must be deleted from TISF and ONCALL (takes them back to preliminary status – FPLST) with the NNFP;COMD format before reinstructing.
  - Fire by voice on either the voice fire net or command fire net (follow unit SOP).
- Engage all targets within your group at the same time. The maximum number of targets in a group will be determined by the number of fire units you have available for the group to include any reinforcing unit(s). You can probably expect one-third of the artillery to be moving at any given time, so plan for a maximum of two-thirds of the units available in any one group.

8-9. HASTY FIRE PLANNING PROCEDURES

Hasty fire plans are developed when the situation and time do not permit the construction of normal fire plans. Name a hasty fire plan in accordance with paragraph 8-2.

a. The following are assumptions in hasty fire planning:

- Minimum planning time available.
- Small number of targets in plan.
- Only DS battalion's units (nonbackup fire units) used.
- Minimal target analysis or instructions.
- May not resolve exceptions.
- Plan not built in mutual support unit (MSU) computer.

b. The following are procedures in hasty fire planning:

- Use current MOD file (requires no action).
- Build the current AFU file into the plan.
- Develop the FPLST by using ATI;PREFP and/or NNFP;FPTU.
- Compute the fire plan (NNFP;COMFP, HHOUR, and FPLST:X).
- Execute and transmit fire commands to fire unit(s).

c. If time permits, use NNFP commander's criteria, NNFP;INST, and recomputation procedures in the normal manner to improve the fire plan and resolve any exceptions before executing.

8-10. FASCAM FIRE PLANNING

Planned minefields are established by using the NNFP;FASCAM format in conjunction with a specific fire planning sequence. Battalion cannot alter a div arty FASCAM fire plan. Only FASCAM shells are included in a FASCAM fire plan. The AFU data, battlefield geometry data, and commander's criteria are built into a FASCAM fire plan as with any other fire plan. Minefield location is identified by a center point, depth, width, and altitude. The width of the minefield cannot exceed 1,000 meters. The depth of the minefield will either be 200 meters with low angle and shell antimateriel mine (short delay) (AMS) or antimateriel (AM) mine (long delay) (AML) or 400 meters for antipersonnel mine (short delay) (APS) or antipersonnel mine (long delay) (APL) and combination shell minefields. For combination shell minefields, shell types may be mixed (AM and AP) but short and long delays can never be mixed. Name a FASCAM fire plan in accordance with paragraph 8-2.

8-11. FASCAM FIRE PLANNING SEQUENCE

The recommended FASCAM fire planning sequence in Table 8-2 is developed to help the FSO and the battalion O&I section to execute their fire planning responsibilities effectively. The brigade FSO is the originator of the fire plan in the fire planning sequence. The steps will work equally well for a TF FSO or the O&I section.

Table 8-2. **FASCAM FIRE PLANNING SEQUENCE**

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 1			
a. Establish NNFP MOD file.	NNFP;COMD NNFP;MOD NNFP;XCLUDE NNFP;FUSEL		If step 1 is omitted, the system will use criteria established for tactical fire control. FSO input is based on commander's criteria. Only changes need to be input. With appropriate guidance, O&I may input.
b. Establish related files.	AFU;BUILD SPRT;BUILD		Fire units and geometry data to be used must be included. FSO input is based on fire units and geometry to be used in the fire plan.
c. Review NNFP MOD file.	NNFP;COMD AFU;COMD SPRT;COMD	NNFP;4221 AFU;2203 SPRT;7202	This action cannot be done at VFMED. The MOD file can be printed only at FDC. The FSO requests O&I to review files to ensure correct data are reflected.
STEP 2			
a. Compute fire plan solution.	NNFP;FASCAM	NNFP;4228 SPRT;BGEOM (PSFZ)	Use of the NNFP;INST message from this step on requires recomputation of fire plan.
b. Review fire plan solution for problems and final coordination.	NNFP;COMD	NNFP;XTGTs NNFP;XSCDs	An exception to the fire plan may occur and must be resolved.
c. Modify computed fire plan.	NNFP;INST		This action is used to change fire units only for specified target(s).
	NNFP;FASCAM	NNFP;4228 SPRT;BGEOM (PSFZ)	This action is used to change minefield parameters or include fire units via NNFP;INST. This action also recomputes the fire plan.
STEP 3			
a. Execute fire plan.	NNFP;EXECFP	NNFP;4229	**Do not enter XMIT.**
b. Review fire command summary.			The FDO or O&I will review NNFP;4229, FASCAM Fire Command Summary, and compare it with the NNFP;4228.
c. Transmit fire commands to batteries.	NNFP;EXECFP	NNFP;FC	Enter XMIT;X. The ACCO will process the SPRT;BGEOM to store the laid safety zone (SFZ) in current situation.

Table 8-2. **FASCAM FIRE PLANNING SEQUENCE (Continued)**

ACTION	RELATED MESSAGE	OUTPUT REPORT MESSAGE	REMARKS
STEP 4			
a. Update files.	AFU;BAMOUP		This action is used to account for ammunition expenditures (FDC and/or O&I).
b. Delete files.	NNFP;COMD		This action is used to purge plan from SPRT, AFU, and NNFP files.
NOTE: When current ammunition levels are to be considered or fire units have recently moved, AFU data must be updated immediately. The fire plan must be recomputed, modified as necessary, and executed again with the new fire unit data.			

8-12. BUILDING A FASCAM FIRE PLAN WITH TACFIRE

a. Build a MOD file as shown in Figure 8-16.

b. Build an AFU file as shown in Figure 8-17.

c. Build a SPRT file as shown in Figure 8-18.

d. Establish and compute a FASCAM minefield as shown in Figure 8-19.

e. Send for the FASCAM TISF as shown in Figure 8-20.

f. Watch for the EXC field at the end of the NNFP;XTGTs to determine if exceptions exist. An entry of 1 indicates a scheduling exception, which means you did not allow enough time between HHOUR and NLT fields. An entry of 2 indicates a capability exception, which means that the available fire units could not defeat the target based on the guidance established in the MOD file or the target is out of range for all units. An entry of 3 indicates an ammunition exception, which means there is not enough ammunition on hand for selected fire units to engage the target with the selected shell-fuze combination.

Figure 8-16. **BUILDING A MOD FILE**

Format:	NNFP;COMD
PLAN:	Leave blank.
NEWPLN:	Enter your plan name IAW TC 6-40A, Appendix B (paragraph 8-2).
DEFAULT:	X
BUILD:	X
MODF:	X

Figure 8-17. BUILDING AN AFU FILE

Format:	AFU;BUILD
PLAN:	Leave blank.
NEWPLN:	Enter your plan name.
FU:	Enter fire unit name as needed for specific information (not entered with WPN).
WPN:	Enter weapon system as needed for specific information (not entered with FU).

Figure 8-18. BUILDING A SPRT FILE

Format:	SPRT;BUILD
PLAN:	Leave blank.
NEWPLN:	Enter your plan name.

Figure 8-19. ESTABLISHING AND COMPUTING A FASCAM MINEFIELD

Format:	NNFP;FASCAM
PLAN:	Enter your plan name.
TGT:	Leave blank.
HHOUR:	Enter hour and minute to start firing (emplacing) minefield.
NLT:	Enter hour and minute the minefield is to be finished emplacing.
ALTER:	Leave blank (unless recomputing).
CORD:	Easting/northing/altitude of center point
GZ:	Leave blank unless CORD not in MAP MOD.
SPHERE:	Leave blank unless CORD not in MAP MOD.
SIZE:	Width (200 to 1000), depth (200 or 400)
ATT:	Azimuth of long axis of minefield in mils
DEN:	Enter ammunition density (LOW, MED, or HIGH)
ANGLE:	If depth is 200, enter LOW. If depth is 400, leave blank or enter LOW
SH:	If depth is 200, enter AMS or AML. If depth is 400, enter: AMS or AML APS or APL AMS/APS or AML/APL
FZ:	Enter TIB (if mixed mines - TIB/TIB).
TO:	Enter your subscriber name.
FCORD:	Enter establishing agency for fire support coordination of the safety zone.

NOTE: With your name in the TO field, an NNFP;4228 and a SPRT;BGEOM (PSFZ) will be sent to you. This does not necessarily mean the fire plan has no exceptions. The FASCAM TISF will have to be obtained to determine if any exceptions exist.

Figure 8-20. **SENDING FOR THE FASCAM TISF**

Format:	NNFP;COMD
PLAN:	Enter your plan name.
XMIT:	X
TO:	Enter your subscriber name.
FASC:	X

NOTE: The FPSUM can no longer be transmitted.

g. Exceptions for FASCAM fire plans **cannot** be resolved in the same manner as regular fire plans.

(1) Scheduling Exceptions. If additional time is available for the fire plan, recompute and allow more time between the HHOUR and NLT fields. If additional time is not available, analyze the target (or ask O&I to analyze) and reduce the number of targets (aimpoints) to be fired to what can be fired in the available time. This can be done by changing entries in size and density fields.

(2) Capabilities Exceptions. Analyze the target (or ask O&I to analyze). Additional fire units may have to be built. The last alternative is to delete the target. Be prepared to make that decision based on your maneuver commander's guidance.

(3) Ammunition Exceptions. Select a different fire unit to engage the target. (You may have to build more units into the plan.)

h. Make changes to the target engagement criteria with the NNFP;INST format (the only change that can be made to a FASCAM fire plan target with the NNFP;INST is to select a different fire unit to engage the target) and recompute the fire plan with the NNFP;FASCAM. Other changes can be made on the NNFP;FASCAM. After all computations, review the entire FASCAM TISF to ensure that no new exceptions were created.

i. At this point, O&I should execute the fire plan and compare the fire commands with the NNFP;4228 before sending data to the fire units. If the comparison is good, O&I will then transmit fire commands to the fire units.

j. Once the fire plan has been fired and the data on file are no longer needed, perform file maintenance on the fire plan as shown in Figure 8-21.

Figure 8-21. **PERFORMING FILE MAINTENANCE**

Format:	NNFP;COMD
PLAN:	Enter your plan name.
PURGE:	X

8-13. ABBREVIATIONS

To save space, use authorized abbreviations or acronyms when sending PTMs.

8-14. MESSAGE TO OBSERVER

The MTOs will be sent in FM;MTO format. Sample MTOs (with explanations of the information they provide) are shown in Table 8-3.

8-15. KNOWN POINTS

The following information pertains to known points:

- Maximum capacity in the TACFIRE computer is 99 known points.
- Delete known points when they are no longer needed.
- Their purpose is to have points in the computer from which to shift.
- To establish known points without firing, use the FR;GRID format:
  - Enter target easting, northing, and altitude.
  - Enter EOM RAT in the control field.

  (You will receive a mini MTO with a known point number.)

- To give an existing target (a target in the TACFIRE target file) a known point number, use the FR;QUICK format:
  - Enter a number in KNPT field.
  - Enter existing target number in TGT NO field.

  (Remember, you cannot shift from a target. You shift only from a known point.)

Table 8-3. **SAMPLE MTOs**

DISPLAY	EXPLANATION
AUF: /1/A/3 /3 ;VOL:01;UNITS:03;	1st Plt, Battery A adjusts with three volleys in effect.
AUF: BLANK ;VOL:03;UNITS:03;	FFE has been requested—three platoons firing a total of three volleys.
VOL:03;UNITS:93;	Additional artillery from a reinforcing battalion will be included in the mission.
VOL:00;UNITS:90;	Mission was handed off to a reinforcing artillery battalion.
VOL:00;UNITS:00;	Mission was denied; observer should immediately send EOM.

8-16. PRIORITY TARGETS

The following information pertains to priority targets:

- The number of priority targets available within a maneuver brigade is limited.
- The brigade FSO allocates priority targets and informs the battalion FDC who is authorized them.
- Use the following procedures to establish priority targets:
  - Send a PTM to the FDC with the message PRIORITY TARGET FOLLOWS.
  - Using the FR;GRID format, enter target easting, northing, altitude, and enter AMC/FFE in the CONTROL field.

  (You will receive an MTO with a target number from the battalion FDC target block.)
  - Send EOM.

  (You should receive a PTM from the battalion FDC stating which fire unit has your priority target.)
- To fire your priority target, use one of the following procedures:
  - Send an FR;QUICK message with your priority target number in the TGT NO field and a number 1 in the PRI field.
  - Call the fire unit which has your priority target **_____(fire unit call sign) THIS IS _____ (observer call sign), FIRE PRIORITY TARGET (number).**
- To cancel a priority target, send a PTM to the battalion FDC with the message **CANCEL PRIORITY TARGET (number).**

> ***NOTE:*** If a platoon is moving and it has your priority target, your request to fire it may result in a delay. The battalion FDO will select another platoon to fire or generate a hip shoot for the moving platoon.

8-17. DMD AND FIST DMD

The DMD and FIST DMD are the two devices used at company level to access TACFIRE. The DMD is a single-channel device (receives and transmits on only one radio or wire net) used by the FO for limited fire support planning, to report battlefield information, and to transmit calls for fire. The FIST DMD is a

multichannel device (receives and transmits on up to four radio or wire nets) used by the company and TF FSO for fire support planning, fire support coordination, reporting battlefield information, and transmitting calls for fire. The FIST DMD has the capability to send and receive from 20 subscribers on 4 different nets. This capability offers the brigade FSO a multitude of employment options. In a centralized mode, the company FSOs can route their messages to the TF FSO's FIST DMD on the mortar net. The FSO reviews the mission and then transmits to the battalion TACFIRE computer on an assigned FD net. In a decentralized mode, the company FSO can send his mission directly to TACFIRE on an FD net. The US Marine Corps and some light US Army forces use the digital communications terminal (DCT) instead of the DMD. For more information concerning the DMD, FIST DMD, or DCT, refer to FM 6-30.

GLOSSARY

AA	assembly area
ABCA	American, British, Canadian, and Australian
ACA	airspace coordination area
ACP	air control point
ACR	armored cavalry regiment
AD	air defense
ADA	air defense artillery
ADAM	area denial artillery munitions
AFSO	aerial fire support observer
AFST	aerial fire support team
AFU	ammunition and fire unit
AHRS	attitude and heading reference system
ALO	air liaison officer
alt	altitude
AM	antimateriel
AML	antimateriel mine (long delay)
ammo	ammunition
AMS	antimateriel mine (short delay)
ANGLICO	air and naval gunfire liaison company
AP	armor piercing
APAM	antipersonnel and antimateriel
APC	armored personnel carrier
APERS	antipersonnel
APICM	antipersonnel improved conventional munitions
APL	antipersonnel mine (long delay)
APS	antipersonnel mine (short delay)
AR	armor, armored regiment
arty	artillery
AS	Australia
ASOC	air support operations center
ASPS	all-source production section
AT	antitank
ATACMS	Army tactical missile system
ATAS	air-to-air Stinger
ATHS	airborne target hand-over system
ATI	artillery target intelligence
atk	attack
avail	available
avn	aviation

BB	battleship
BCS	battery computer system
BCT	briefcase terminal
BDA	battle damage assessment
bde	brigade
BE	Belgium
BFV	Bradley infantry fighting vehicle
BICC	battlefield information coordination center
BMNT	beginning (of) morning nautical twilight
BMP	amphibious infantry combat vehicle
bn	battalion
BOMREP	bombing report
BP	battle position
BRDM	recon/C3 vehicle
BSO	battalion signal officer
btry	battery
BUCS	backup computer system
CA	Canada
cal	caliber
CAS	close air support
catk	counterattack
CB	counterbattery
CCP	communications checkpoint
cdr	commander
CEWI	combat electronic warfare and intelligence
CF	command/fire direction (radio net)
CFL	coordinated fire line
CFV	cavalry fighting vehicle
CG	guided missile cruiser (Navy)
CGN	guided missile cruiser, nuclear (Navy)
CM	countermortar
cmd/ops	command/operations (radio net)
CNR	combat net radio
co	company
COC	chain of command
COLT	combat observation/lasing team
COMJAM	communications jamming
COMSEC	communications security
CP	command post; concrete piercing (fuze)
Cphd	Copperhead
CRP	combat reconnaissance patrol
CS	combat support
CSR	controlled supply rate
CSS	combat service support
CVT	controlled variable time
DA	Denmark
DASC	direct air support center
DCT	digital communications terminal
DD	destroyer (Navy)

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